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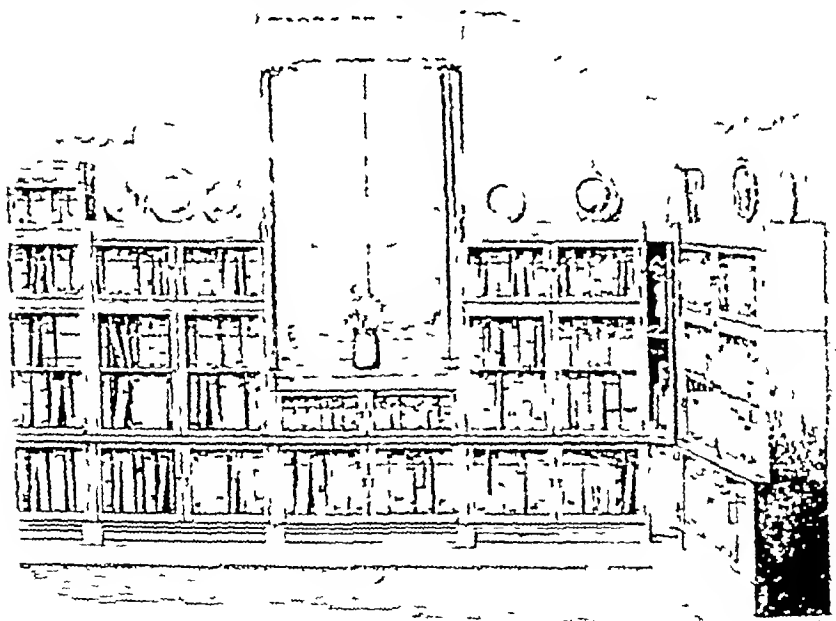
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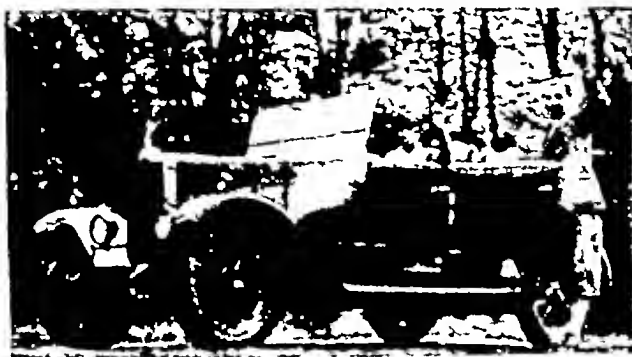
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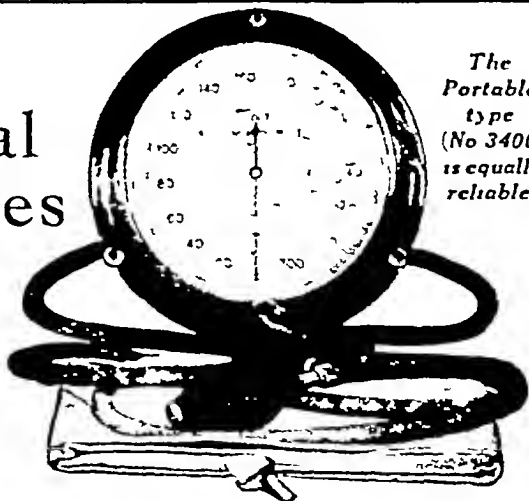
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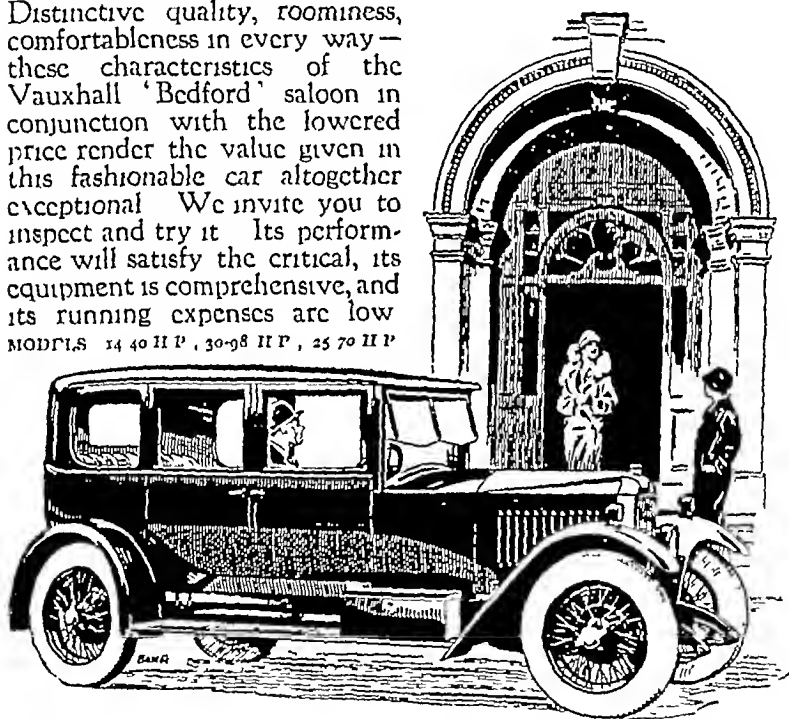
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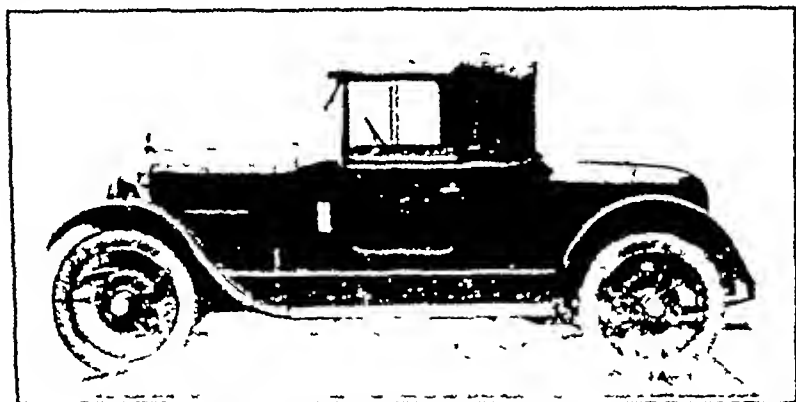


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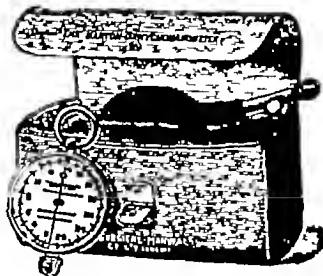
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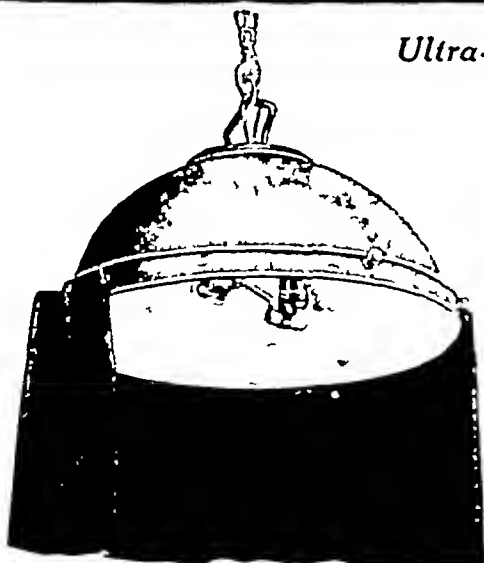
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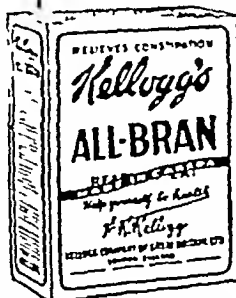
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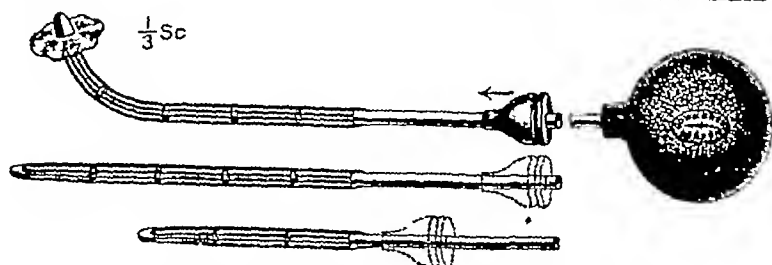


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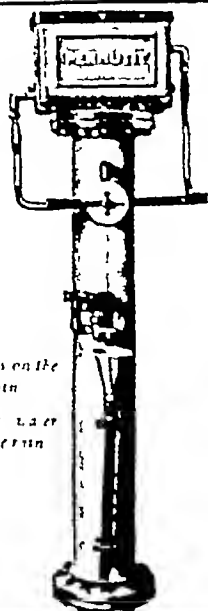
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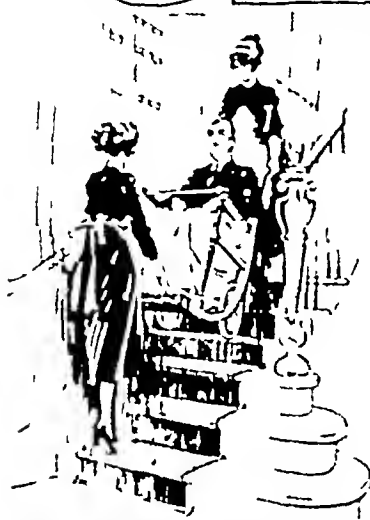
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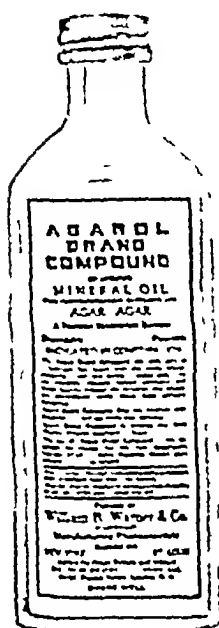
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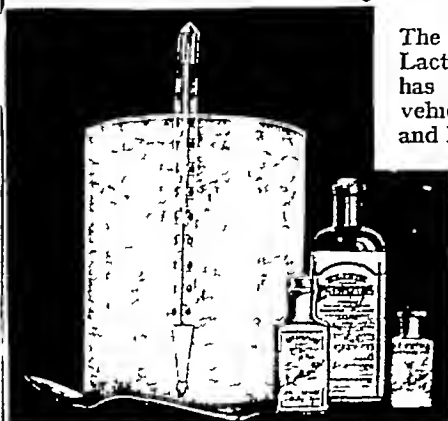
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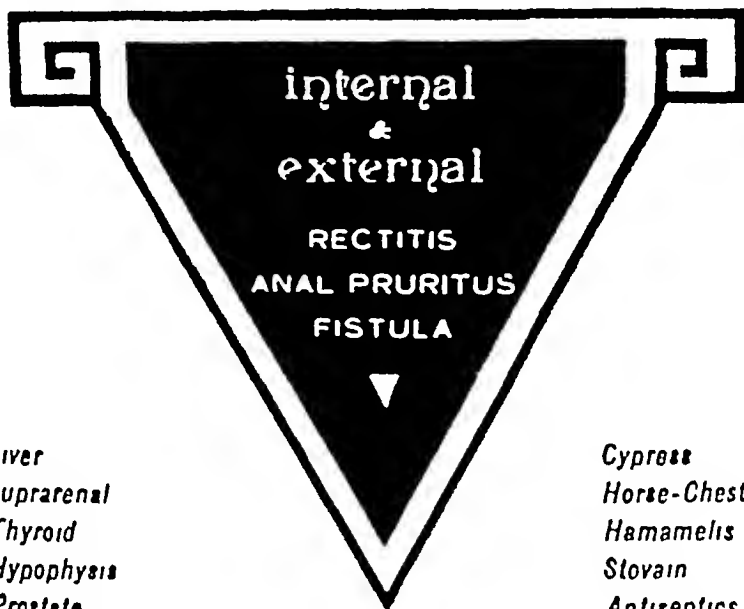
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Case 3—Quarryman, aged 42 For several weeks had a feeling of coldness in the flanks and lumbar region When he stoops he gets a pain in the back, going down to the legs When he walks from work between two friends he bumps into one or other as if he cannot walk straight Legs weak All symptoms worse in the evening History negative, denies infection Had similar pain four years ago, which disappeared spontaneously

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I am indebted to Dr Ceinwen Evans, Mental Hospital, Denbigh, for preparing the sections, and to Messrs Ross for the microphotographs

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The Problem of Gonorrhœa in General Practice.

By E R TOWNLEY CLARKSON, M A , M R C S , L R C P

Honorary Surgeon to Out-Patients, St Paul's Hospital, late Senior Clinical Assistant, Genito Urinary Department (Male), London Hospital, Honorary Secretary, Medical Society for the Study of Venereal Diseases, Joint-Editor, "British Journal of Venereal Diseases"

THE opportunities afforded until the last few years for gaining a systematic training in the diagnosis and treatment of gonorrhœa (and of syphilis) have been scanty at most teaching hospitals, and non-existent in others. Although facilities have been increased, yet up to about two years ago when instruction became obligatory, most students had not utilized them. A large proportion of practitioners, therefore, have no desire to undertake the treatment of venereal diseases. Some regard such work as entailing an undue and unremunerative tax upon their time, others feel that the knowledge by the public that they are so engaged is likely to injure their general practice. I will show that the difficulty as to time is not insuperable. The consideration of the financial factor and of the effect of such work upon his practice is one to be considered by each practitioner.

There are, however, practitioners who, living in districts remote from V.D. clinics, realize that they may be called upon to treat patients suffering from venereal disease. Their sense of duty, coupled with a scientific interest, creates a desire to obtain knowledge of a subject which they know they do not possess. I assume that my readers belong to the latter class. What is to happen to patients if there is no clinic or other medical man for them to attend? Satisfactory

as they may deem their condition to be after self-treatment, or nature has worked an apparent cure, their future will be fraught with disaster. Humanity demands the prevention of such catastrophes. If experience at a clinic cannot be obtained, then the necessary help must be provided by books and journals. There are many volumes which deal separately or conjointly with gonorrhœa and syphilis. These three are brief, pertinent and valuable: (1) "Modern Diagnosis and Treatment of Chaneroid, Syphilis and Gonorrhœa." By L. W. Harrison Constable Pp. 167; (2) "Common Diseases of the Male Urethra" By Frank Kidd Longmans Green & Co Pp 132; (3) "Common Infections of the Female Urethra and Cervix." By Frank Kidd and A. Malcolm Simpson. Oxford University Press Pp. 191.

I advise practitioners to keep to one book, and when they have mastered it, then to range more widely and deeply. With a hope of usefulness I have made out a scheme showing the main stages of investigation and treatment (page 223). This will, I hope, give a clear idea of procedure and of the inter-relation of the different divisions of the subject. For instructions as to diagnosis and treatment, turn to the textbook. I have given notes upon certain fundamental subjects which I know from my hospital and private experience are neglected to a disastrous extent. My wish is that these may give that sense of proportion which it is so hard to obtain when studying alone. I treat of those matters which are vital, and with reluctance leave much that is important.

The practitioner who is not prepared to give patients treatment as efficient as they would receive at a V.D. clinic, and who is unwilling to learn, has no right to treat a patient who is or may be suffering from venereal disease. The tragedies, physical, mental and moral, which result from imperfect treatment, make grim reading. The man who adds to these, through careless

incompetence, assumes a great responsibility.

A presentable and un-suggestive-looking cabinet, decorative or otherwise, which will hold all apparatus and instruments, can be bought, in which everything is kept within easy reach and out of prying eyes. By using this a marked saving of time in respect to treatment will be achieved. The makers are Messrs. J. H. Montague, 69, New Bond Street, London.

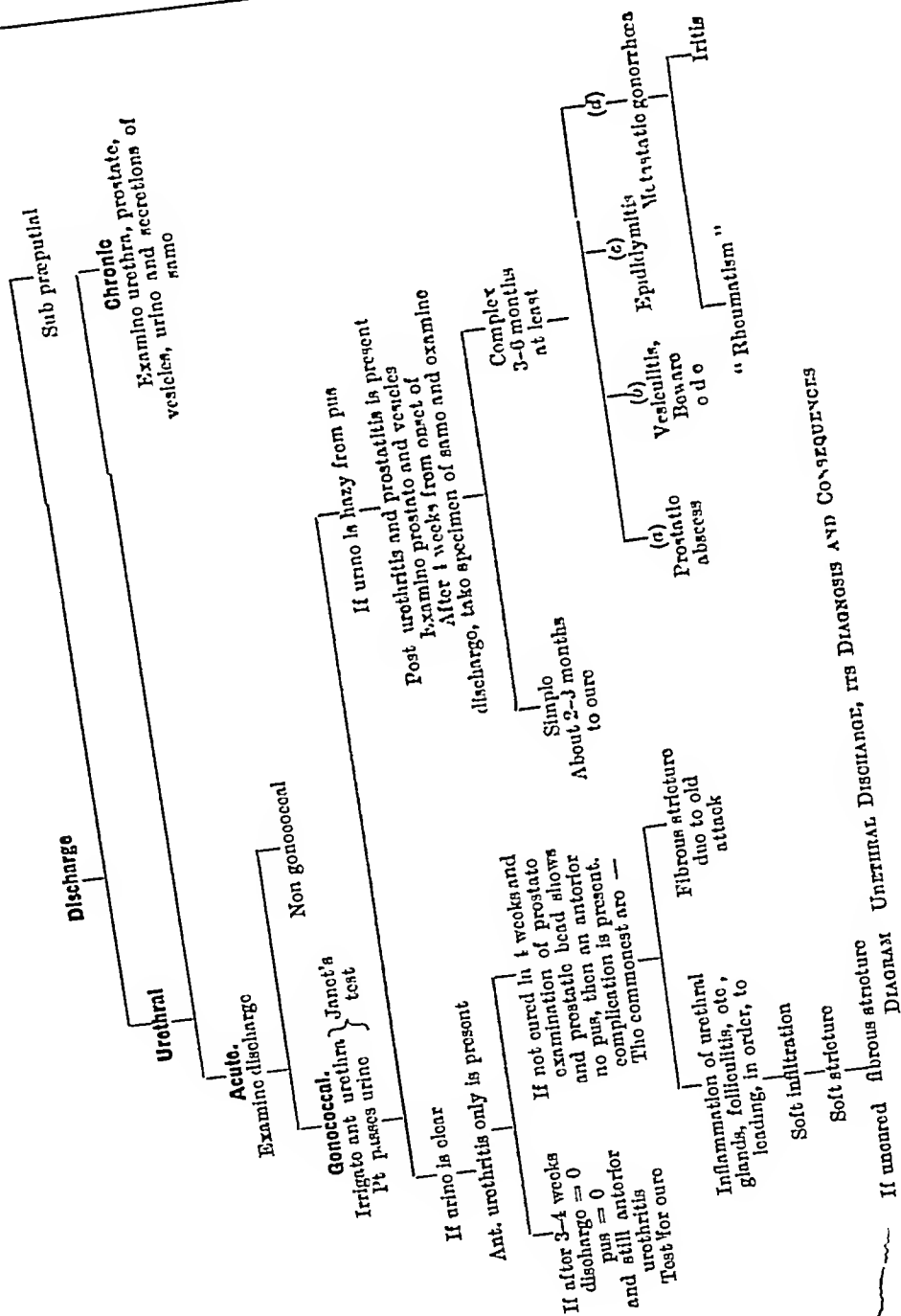
GENERAL CONSIDERATIONS.

To make a diagnosis, to estimate the progress of treatment, and to show when a patient is cured, a microscopic and bacteriological examination of certain specimens are necessary.

Outfits containing culture tubes, etc., can be obtained from the medical officer of the district, and specimens can be sent up for expert examination free of charge. It will be of interest to take and examine duplicate specimens. In certain circumstances, patients who are unable to pay their railway fares between their homes and the clinic to which they have been advised to go or have gone on their own initiative, may have their fares paid. For particulars, application should be made to the M O H. of the county or county borough.

Take the history, make a diagnosis based on clinical, microscopic and bacteriological evidence. Decide if the discharge is (a) from the urethra or (b) is sub-preputial. If it is urethral, is it gonococcal? Is the infection confined to the anterior urethra or does it involve the posterior also?

If there is anterior urethritis only, examine prostate and vesicles, treat according to the textbook, and when it seems well test for cure (page 236). If there is a haze or discharge after four weeks and the urethritis is still anterior only, probably there is some complicating factor, e.g. inflammation of the urethral glands (folliculitis), soft infiltrations, or an old standing stricture



URETHRAL DISCHARGE, ITS DIAGNOSIS AND CONSEQUENCES

Treat these according to the textbook. When all seems well, examine the prostate and vesicles, and test for cure.

If we find by Janet's test that a posterior infection is present at the end of a month from the onset of discharge we examine the prostate and vesicles. Massage prostate and examine film for pus cells, make for purposes of comparison a note of the amount of pus, and find out if the infection is confined to the prostate or has involved a vesicle or vesicles. If prostatitis only is present, it will take about $1\frac{1}{2}$ months longer to cure the patient. If complications ensue in the shape of prostatic abscess, vesiculitis, epididymitis, gonococcal rheumatism or iritis, etc., treat them according to the textbook. It will be $3\frac{1}{2}$ to 6 months before the patient will be ready for the final tests.

I ought to utter a caution. It may be necessary to treat a patient who has been cured of drunkenness. Always make certain of this before advising a patient to take alcohol for test purposes or he may re-succumb to the old temptation. There are other provocative drugs as effective if not as palatable as alcohol.

HISTORY.

Listen attentively to the history. Amidst much chaff there may be some grain. Obtain information about contacts, find out if the infection has been innocently acquired. The cynic in his narrowness of worldly outlook says there is no accidental infection. It happens frequently in children, occasionally in adults. Great mental and physical suffering may be caused by an ignorant and careless assumption of cynicism. A patient often denies that he has had sexual intercourse. Be sure to ask if he has practised any form of contact without achieving vaginal penetration, or rectal or oral coitus. Careful enquiries bring much to light which otherwise would be unrevealed. Make enquiries about rheumatism, sciatica, lumbago.

The patient may have been with one or more

consorts in whom the disease is undetected, and attempts to track casual and subsequent contacts must be tactful and incisive. The potentiality for preventive work by medical practitioners is great.

DIAGNOSIS.

On the necessity of examining every urethral discharge—Here is an example of ignorant optimism which failed to recognize the importance of examining every urethral discharge

A patient told me that some four months before he had a urethral discharge. His practitioner said that it was not important, and gave him no systematic treatment. A few weeks later he was operated upon for inguinal hernia. Before and after the operation he told the surgeon that he still had a discharge, and was assured by the latter and again by his doctor that nothing was wrong. I found that he had a profuse urethral discharge containing gonococci. My diagnosis was confirmed by a bacteriologist. Vesiculitis, etc., had developed and the man's condition had become very serious.

Has the patient urethritis?—When the discharge is not urethral but sub-preputial, what are the commonest causes? (1) Syphilis or chancroid. If the prepuce cannot be retracted after hot fomentations, etc., slit it up and examine the sub-preputial area. A sore may be discovered which is proved to be syphilitic. Immediate treatment may save a patient from untold misery and premature death. (2) Simple balanitis, with or without erosion, and smegmatic calculi.

If the discharge is urethral—is it gonococcal?—Examine films by Gram's method, or send up two or three unstained films. Recognition of gonococci is not so easy as is imagined. The health of the patient and of others depends upon the diagnosis. Do not rely upon results obtained by staining with methylene blue.

If the discharge is not gonococcal it may be due to one of the following—(1) Exacerbation of a chronic vesiculitis or prostatitis, with staphylococci, *B. coli*, etc., with or without a previous attack of gonorrhœa; this is the commonest cause. (2) Chancre of the urethra, often

Treat these according to the textbook. When all seems well, examine the prostate and vesicles, and test for cure.

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If a medico-legal factor be involved (assault, separation, divorce, etc.), the practitioner should, in the interest of justice and himself, submit specimens for expert examination. Injury and injustice may result if he forgets that a urethral discharge may be caused otherwise than by venereal infection.

Chronic gonorrhœa.—If a patient complains of an intermittent discharge often associated with alcohol or sexual excitement, the usual cause is an infected vesicle, the duct of which is partially or at times entirely occluded. Make a rectal examination. Massage first one vesicle and examine its contents. Tell the patient to micturate, massage and express the contents of the other vesicle. Have films and cultures made from these specimens examined, and act accordingly.

INSTRUCTIONS.

Tell the patient (1) that the disease is curable if he co-operates with his doctor, and does all he can to maintain his mental and physical resistance; (2) that you cannot say how long the treatment will take. If the infection is confined to the anterior urethra, and there are no complications, he may be cured in four or five weeks, but if the prostate is involved the average time is $2\frac{1}{2}$ months, so long as no complications arise. Tell him there is no royal road leading to the cure of gonorrhœa, that the "quick cures" are generally unreliable, and that the satisfaction felt at the time of the cure is more than counteracted by the disappointment and suffering which follow in the months or years to come. A paper of instructions should be given and understood by the patient. Books on gonorrhœa give these, or printed slips edited by Dr T. T. B. Watson, and published by Messrs H. K. Lewis & Co., of 136, Gower Street, London, are useful and time-saving. It is imperative that the patient should not be warned merely against taking "alcohol," but, owing to the comfortable belief that cider and port are non-alcoholic,

of pyosalpinx, and the fate of most is due to an undiscovered or inefficiently treated vesiculitis. Always remember that *to cure a man of vesiculitis is to save a woman from pyosalpinx*. The onset of vesiculitis suggests the possibility of metastatic trouble such as epididymitis, arthritis or iritis. If the patient will not go to bed, it will be wise to give up the case. In addition to ordinary treatment, I have the greatest belief in hot saline rectal douches, 120°–125° F, given twice a day. Give suppositories (morphia gr $\frac{1}{4}$, extract of belladonna gr $\frac{1}{4}$) night and morning, when there is much pain.

Gonococcal rheumatism—Of all complications of gonorrhœa, that metastatic variety, inaccurately termed gonococcal rheumatism, is to be most dreaded. Usually it affects the joints, but the non-articular parts of the bones, ligaments, muscles, fasciæ, nerves, pericardium, endocardium, and spinal meninges may be implicated. Often gonococcal rheumatism is preventable. If the vesicles were examined always, they would be found to be infected very much more often than is suspected. By prompt treatment, metastatic complications would often be prevented. At the risk of reiteration, let me advise the practitioner always thoroughly to examine the vesicles, and to pay attention to past or present reports of rheumatism, lumbago, etc. The treatment of gonococcal rheumatism will call for all his resourcefulness, courage, and perseverance. His reward may be the saving of patients from lifelong crippledom. Here are a few points I venture to emphasize:—

(1) Patients suffering from acute gonococcal arthritis should be in bed.

(2) Splints should only be used (a) in hyper-acute conditions and then for the shortest time, (b) when the slightest movement produces great pain and awakes the patient. Splints invite ankylosis.

(3) Radiant heat is a most valuable factor in

treatment.

(4) Massage of the muscles should be employed as soon as possible. Active movements should be performed by the patient two or three times a day for two to three minutes. By so doing ankylosis with its physical and economic crippling will be prevented. It is difficult to restrain masseuses from carrying out passive movements at the beginning. This should be done only in order to estimate the mobility of the joints.

A patient with gonococcal rheumatism will never recover unless the primary focus of infection is speedily and actively attacked. In the male the focus is in the vesicles. If they are not treated incalculable harm may result in spite of using every weapon in the therapeutic armoury.

Gonococcal rheumatism affords an exception to the general rule of refraining from posterior irrigation and prostatic massage in acute posterior cases. Give posterior irrigation daily, and massage the vesicles whether enlarged or not. The need to treat the vesicles outweighs the risk of inducing epididymitis since another metastatic complication may evidence itself such as iritis. Epididymitis is preferable to blindness. When the condition has become chronic, posterior irrigation should be given twice a day, followed by prostatic and vesicular massage twice a week. On one of these occasions use mercuric oxycyanide 1/5000, pass a large sound and leave it in the bladder for about two minutes and massage after its removal.

Vaccines—Vaccines have been employed largely in the treatment of gonorrhoea, but not always with sufficient knowledge. Those inexperienced in the relationship of vaccines to gonorrhoea should refrain from using them on their own initiative. Through their inutility time may be lost; through their potency increased trouble may be caused. It should

not be thought that there is never a time and never a condition for the use of vaccines in gonorrhœa. At times they may be one of the most valuable weapons in our armoury, particularly as regards the treatment of metastatic infection.

Urinary obstruction—During an acute urethritis the patient may be unable to micturate. If retention is not due to prostatic abscess, act as follows until success is gained. Avoid operative or instrumental treatment unless absolutely necessary.

A (1) A soap and water enema. If this does not avail, give laudanum, m xxx.

(2) Place patient in a hot bath for 15–30 minutes, and carefully watch him, lest he faint, he will probably succeed in passing water.

(3) About $1\frac{1}{2}$ to 2 drachms of the following solution should be injected into the urethra:—

R	Stovaine 2%	-	-	-	5m
	Adren hydrochlor	1/1000			m m
	Aq dist	-	-	-	ad m xxx

(4) A catheter should be passed with all aseptic precautions. If it is impossible to pass a catheter, then make a suprapubic puncture.

B If a prostatic abscess renders micturition difficult or impossible, then give patient hot rectal saline irrigation, 120–125° F. Gentle persuasive digital pressure on the prostate will sometimes rupture the abscess and discharge its contents into the urethra. If retention is due to prostatic abscess and cannot be relieved, it should be opened by a surgeon.

C If retention occurs, and urethritis and prostatitis are ruled out, it is probably due to an old standing stricture. A chill, alcoholic bout, or sexual excess will cause the gradually diminishing stream to cease. Adopt methods mentioned under (A). When relief has been secured, give hexamine grs v, tds, render urine acid by acid sod phosph if necessary.

A urethroscopic examination is desirable: more definite information can thus be obtained than by a

bougie blindly groping in the urethral darkness. This may be impossible, then find out what you can by gum elastic bougies without passing them into the bladder.

Here are a few fundamental suggestions.—

(1) The passage of an instrument into a man's bladder for the first time in his life is a serious proceeding. His welfare and even his life depend upon the caution and skill which you exercise.

(2) Never pass a sound or bougie without first introducing a disinfectant fluid, such as mercuric oxycyanide 1/5000 into the bladder. Pay scrupulous attention to your own manual and the patient's mental toilet; the occurrence of cystitis, etc., will then be reduced to a minimum. If a local anæsthetic is required, use, for compressor spasm, novocaine 3 per cent, stovaine 0.3 per cent, or percam 1/1000. Never introduce cocaine into the urethra, otherwise death may ensue.

(3) Start with a large instrument and work down the scale until an instrument passes the stricture.

(4) Give a bayonet-shaped bend to the tip of the bougie; rotate the instrument when it is against the stricture, and then pass it through the orifice. The adoption of this manoeuvre will reduce the number of so-called "impassable strictures."

(5) Let the irrigating fluid be as warm as the patient can comfortably bear it.

Gonorrhœal ophthalmia.—If a patient contracts primary gonorrhœal ophthalmia or metastatic gonorrhœal ophthalmia or gonorrhœal iritis, follow the first-aid instructions in your textbook, and insist on the patient being seen by an ophthalmic surgeon at once.

Stricture—Every patient who has suffered from a stricture should be advised to see his practitioner from time to time, the interval between these visits to be decided by the nature of his stricture. In this way any serious results which may develop from recurring stricture may be avoided.

STANDARD OF CURE.

One of the great responsibilities is to decide whether or not patients who have suffered from venereal disease are fit to assume or resume conjugal relations. If a verdict of "cured" is given carelessly, patients will pass from the consulting room as disseminators of disease. I give an example.—

A man is "cured" and discharged. After months or years (without any exposure to fresh infection) he marries. Soon he suffers from the old complaint. Here is the tragedy. He is forced to a conclusion which he would give all he possesses to forgo. His data are, to him, irrefutable. He was told that he was "cured." He has been chaste. He finds that he and his wife have gonorrhœa. He can only conclude that his wife has strayed from the way of virtue. Husband and wife are each convinced of their integrity, there is no mediator to explain and heal the breach. A permanent wreckage of happiness seems inevitable.

What is the explanation? The standard of "cure" originally set up was low. There was no discharge, the urine was clear and without threads or flakes, and the prostate, if examined, was pronounced "all right." In one or both of the vesiculæ gonococci had lingered during months or years, to come out of their lairs on the consummation of a marriage. The husband's bridal gift to his wife was a terrible one. If, at the time of "cure," the contents of the vesicles had been expressed, examined, and the infection treated, eventually all would have been well.

I merely refer to pyosalpinx, sterility, gonococcal rheumatism, and chronic invalidism, and the other conditions which may result from carelessness of "cure." It is stated that gonorrhœa is a causal factor in nearly half the number of women suffering from diseases peculiar to their sex. It is unnecessary to emphasize the responsibility we assume when we discharge a patient who has suffered from gonorrhœa. A rigorous standard is imperative for the married man, in order to protect his wife. An equally rigorous standard is necessary for the amorously-fitting bachelor, in order

to safeguard society.

(1) Satisfy yourself that there is nothing in the condition of the penis, testicles, prostate, vesicles and vasa deferentia which should prohibit marriage. Examine for cystic vesicles, minute abscesses in prostate, and the faint "dusty" haze in urine. Palpate urethra over a sound in order to detect fine urethra lesions, etc. A urethroscopic investigation is desirable though not always feasible.

(2) The urine, any urethral moisture, the prostatic and vesicular secretions (obtained separately) should be submitted to microscopic and bacteriological examination after treatment has ceased for two weeks. Then alcoholic or other provocative treatment (instillations of AgNO_3 , 5 grs to the ounce) should be given, and another test carried out.

I cannot emphasize too strongly my belief that, when the examinations as mentioned under are carried out by an expert, far greater reliance is to be placed on the results obtained than upon negative ones accruing from bacteriological investigations.

It is important that, after the prostate and vesicles have been massaged, and the resultant secretions obtained, no irrigation or injections should be given. By thus refraining, some of the expressed vesicular and prostatic fluid may be left in the deep urethra. Frequently it will be found that, within twenty-four to forty-eight hours, the patient will notice a profuse, yellow urethral discharge, containing gonococci. The discharge is due to auto-infection of the urethra, as the result of the massage. Such re-infection occurs especially when the prostate is sclerotic, a condition evidenced by the presence of isolated hard areas. If an irrigation had followed upon the massage, these infective secretions would have been washed away. There is a possibility that gonococci may not be found in the film or cultures taken immediately after the massage, although they are present in the residue!

deposit in the deep urethra (Malcolm Simpson).

Patients belatedly seeking advice as regards fitness for marriage—It may frequently happen that a patient who has been suffering from an old attack of gonorrhœa will seek medical advice only a few days before the time fixed for his marriage. In these circumstances, the medical man has to shoulder a grave and dual responsibility. He must protect the future wife, lest she should contract disease from her husband, and on the other hand, he does not wish to place the husband-elect in a position of serious inconvenience, which may lead on to tragedy. His course is clear. He must insist that the patient shall go through the ordinary marriage tests, and base his opinion as to the advisability of marriage on the result of those tests. The patient will probably plead that there is insufficient time wherein to carry out the tests. In such a case the practitioner must refuse to take any responsibility in the matter. It sometimes happens that a patient presents himself with a condition of one or both vesicles which are suspicious. It is sometimes a difficult matter, especially so when time is short, to decide whether the suspicious condition of the structures is due to a partial retention of purulent contents, or to a fibrotic state of the walls and peri-vesicular tissue. The result of the prostatic and vesicular massage in these cases may not reveal anything of a serious nature, but there is still doubt whether or not the whole contents of the vesicles had been expressed.

Again, in such a case, the medical man must refuse to assume responsibility, or insist that a second competent opinion be invoked. Humanity and wisdom both concur in dictating such a course. A weak pandering to the convenience of the patient may result in life-long injury to his wife.

A prostatic pitfall—A patient states that in the past he had gonorrhœa and that he wishes to know if

he is free from infection. Ask him when he last had sexual intercourse. If this is not done and the patient has indulged, the examination may arouse an incubating infection into a state of abnormal activity. It may spread to the prostate, vesicles or epididymes. The risk must not be taken. Take a full history and make an examination of the urine. Insist on the patient waiting till the days of danger are past, but be satisfied that he knows why you have refused to examine him.

I wish to express my thanks to my friend Dr. Malcolm Simpson for helping me with the counsel of his experience.

Reference

- ¹ Harrison, L W *Trans Med Soc Lond* xlii, 286

The Relief of Reten

By KENNETH M WALKER, FRCS

*Genito-Urinary Surgeon to the Royal Northern Hospital
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St Bartholomew's Hospital*

ALTHOUGH this article deals with the of retention rather than with its cause, it is impossible to avoid some reference to it. In the first place, the practitioner who is called to deal with a failure to pass urine must distinguish between anuria and retention, and also between retention that is paralytic and one that is due to obstruction. This is usually an easy task. If there is an absence of bladder symptoms and no pointing to renal disease either in the shape of long-standing pyuria, or hæmaturia, and if there is a history of increasing difficulty and of a progressive diminution in the calibre of the stream. When the retentive force the patient is likely to be doubled in those moments when the bladder contents make an abortive attempt to void a few drops of urine. If the retention is paralytic pain is absent from the bladder may reach half way to the urethra, the patient having even a desire to micturate.

In the following article I intend to make some remarks to the treatment of obstructed micturition in the adult male. As this must naturally vary in nature of the obstruction it will be convenient to discuss the subject under the following headings:—
(1) Obstruction from acute inflammation of the urethral mucosa, as in gonorrhoea.
(2) Obstruction from reflex spasm and hyperæsthesia.
(3) Obstruction from urethral stricture.
(4) Obstruction from blocking of the ureter by calculus, new growth or papilloma.

catheterization since no anæsthetic is required. In cases of spasm a metal catheter is generally more serviceable than a flexible one.

Retention from fibrous stricture—Our success in relieving a retention due to a tight stricture is in direct proportion to our dexterity in passing instruments. The more expert we are the fewer are the cases of impassable strictures that come under our notice. The circumnavigation of a tight stricture should put us on our mettle. Personally I get from the situation the thrill that some people derive from trying to roll a small ball along a tortuous passage set with obstacles to a final goal. Both contests bring out the same qualities of patience and gentleness of touch. I need not go into all the details of passing a bougie, but will content myself with mentioning a few conditions that make for success. First it is of importance that the patient should strain as little as possible. A preliminary hot bath, a dose of tinct. opii, and a comfortable position by encouraging muscle relaxation materially assist our efforts. We know that anæsthetics, even local ones, by abolishing the gripping power of the urethra deprive the surgeon of a certain assistance in knowing whether the point of his instrument lies within the urethra or in a false passage. Nevertheless there are cases where a local anæsthetic by eliminating pain allows of the catheterization of a nervous patient who would otherwise not tolerate the passage of an instrument, and no hesitation need be felt in having recourse to percaïn or novocain whenever it may seem necessary. The second essential to success in circumnavigating a tight stricture is good lubrication. In a difficult case it is better to ensure that the whole of the urethra is lubricated by distending it with warm sterile olive oil. Oil is a more efficient lubricant than any mucilage, and by distending the urethra we diminish the tendency of the instrument to adhere to every fold of mucous membrane that lurks in the way. In every case, however, it is always a mistake to begin

with too small a bougie. One way of "wiping the eye" of the other practitioner who has failed to pass a filiform is to use a medium-sized metal bougie. Sometimes this will slip past the guns and snares into which the finer instrument has fallen and to the patient's surprise and delight reach the bladder. If the medium-sized bougies cannot be passed select a smaller and then a smaller one until, if that in its turn fails, a filiform is reached. Should we fail with a filiform we cannot comfort ourselves with any theory that the channel is too narrow to admit even this. The explanation can only be that the opening is so eccentric that the tip of our bougie has never found it, or that the false passages are so inviting that it always finds them. Both difficulties must be overcome by wile.

Sometimes the passage of a full-sized instrument down to the stricture will alter the position of a laterally placed opening, so as to allow subsequently of the filiform being passed, and sometimes the same object is achieved by distending the urethra more fully with oil. If neither of these manoeuvres succeed an elbowed or spiral filiform must be selected and the opening found by systematic searching of the circumferences. Should there be more than one stricture the difficulties are enhanced, for even if we succeed in finding the first gateway we lose control of the tip of our instrument before the last has been passed. In this case a small metal instrument may be of service since it allows of better control. When our difficulty is due to false passages, and these are likely to exist if there have been previous inexperienced efforts to thread the maze, the well-known dodge of leaving in situ the filiforms which have fallen into them and passing others along their flank is a useful one. When the most inviting of the pitfalls have been filled a more successful filiform will reach its goal.

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tered in the posterior urethra the catheter may be converted into a more rigid instrument by the use of a curved steel introducer. The obstacle to the passage of the catheter is provided by the distortion and lengthening of the male urethra. In addition to the difficulty caused by lateral deflection of the urethra there is that due to the beak of the instrument impinging posteriorly on a median projection of the prostate. To ride past this the shaft of the catheter must be depressed well between the legs. If this fails the beak may be made to tilt upwards and forwards by slightly withdrawing the introducer as the point of the catheter approaches the bladder. If the urine does not flow when the catheter has apparently been successfully introduced it may mean that the urethra has been so much lengthened by the enlargement of the prostate that the eye is still lying within the urethra. This may be remedied by pushing in the instrument further, or else by selecting a longer catheter. Another explanation for this failure to obtain a flow of urine is that the eye has been blocked by blood clot, a fault that may be remedied by syringing.

If efforts to pass a gum elastic catheter have failed metal instruments of different curves should be tried. It is unnecessary to say that if force be employed a false passage and perhaps severe bleeding will be the result. Not many years ago I gained from an elderly practitioner a useful tip. If one fails to pass a metal instrument change places and try to pass it from the other side of the patient. There will be a slight alteration in the movements of one's hands, a change that may result in the instrument passing along the correct channel. When there is doubt as to the precise position of the beak of the catheter insert a finger into the rectum and by rectal touch assist in guiding it into the bladder.

Should it be impossible to draw off urine *per urethram*, either on account of exceptional obstacles

to catheterization or of clot retention, a suprapubic drainage tube must be inserted. This can easily be done under a local anæsthetic, and in such a manner that a water-tight junction is formed between bladder and tube. Some surgeons carry out this operation blindly with the help of a large trocar and cannula through which a self-retaining catheter can be inserted. Personally, I prefer a small incision just sufficient to allow of the distended bladder being seen and the tube introduced at a point clear of distended veins. Mr. Kidd has made this operation still easier by perfecting an introducer which first stabs a hole in the bladder and then carries into the cavity the head of a Malecot catheter. It is a useful instrument, but can only be employed with the larger-sized Malecots. Should there be any bleeding from the prostate and the likelihood of a smaller tube being blocked by clots this is the right type of self-retaining catheter to select.

I think it would be quite possible to devote an entire paper to a discussion of catheterization in the presence of an enlarged prostate, for there are many abdominal operations that demand for their performance less judgment and skill on the part of the surgeon. A higher standard of asepsis and gentleness is required in catheterization, and the dangers that always lurk in the background, namely, infection and uræmia, are greater than any dangers attending an uncomplicated laparotomy. Of sepsis I need not speak, for the precautions that must be taken in order to avoid it are generally known, but on the subject of uræmia a few remarks may not be out of place. Decompression of a chronically distended bladder should always be continuous, for interruption results in a temporary increase of intravesical tension. As the optimum rate cannot be determined before hand we must be guided by a number of signs and symptoms. Below is a chart which records the changes that occur in secretion

sterile saline. My own experience is that although this manœuvre is worth trying it seldom succeeds, and that the chances of recovery, when too rapid a decompression has been carried out, are small.

Reference

- ¹ Gardner, J A , Cabot's "System of Urology," Vol I, p 662.

Sexual Anomalies and Perversions.

By HUBERT I. NORMAN M.B., Ch.B. D.P.H.

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IT is unfortunately still only too common to find such conditions as sexual anomalies and perversions regarded—sometimes even in medical circles—chiefly as depravity, and, therefore, more suitable for social censure or for penal repression than for scientific investigation. This may be to some extent a heritage of the more ascetic type of religious opinion, which looked askance on all sexuality—culminating in such as St. Anthony, many of whose temptations were “those of the flesh,” or as Origen, that Christian “father,” who castrated himself for the sake of virtue—as he understood it. If ordinary or “normal” sexuality can have come to be regarded from such an angle, it is easy to understand the opprobrium that attached to anomalies and perversions. As a result, discussion has been avoided or even burked. It is necessary only to mention the treatment meted out by the public—as represented by its legal functionaries—to such an earnest student and observer as Havelock Ellis. But such obscurantism merely defers the matter for future consideration, it does not alter the fact that such morbid conditions do exist, ought to be discussed, and must be treated in a scientific manner. That sex has become almost an obsession in certain writers should be no argument against the pleas for calm and dispassionate discussion and for the abrogation of the still-persistent “taboo.”

It is not proposed here to deal with such a topic as the sex-education of the young, but a few remarks may not be out of place, especially as there is not yet

that the individual has diminished power of resistance to ordinary stimuli or stresses. It will be noted that a good many of the individuals are distinctly of a neuropathic type, in others there is a definite association with psychoses, such as, for example, manic-depressive or epileptic insanity, or with conditions of mental inadequacy—senile or alcoholic dementia, mental defectiveness.

It has to be remembered also that each individual passes through a bisexual stage in his ontogenetic recapitulation of his phylogenetic history, and that definite sexual differentiation may not have taken place at birth, and may be even delayed for a number of years, and that in a number of instances psycho-sexual differentiation does not occur. These last are the true cases of sexual *inversion*. Where there is a definite deviation from the permissible—but not overtly acknowledged—sexual eccentricities, it is allowable to surmise that neuropathy or psychopathy exists. These deviations are described as heterosexual or homosexual.

MASTURBATION

Special attention may well be paid to this condition, not because of any great importance of the habit, but because of the unnecessary ado which has been—and is, but fortunately not now to the same extent—made of it. There was a time when it was regarded as being the possible progenitor of most of the ills to which the flesh is heir. If there are added to these the mental disorders and the spiritual maladies which were supposed to spring from the habit, it might be regarded as one of the most pathogenic factors in nature! Most of this may be disregarded. Except for the anxiety which may arise from extraneous factors, there seems to be no necessity to attach more importance to it than to ordinary sexual excess. It is in that excess that danger lies, and it may be more

likely to eventuate in these conditions. It is a method which is impossible to obviate it, the only way out to the individual is the practice and the prejudicial health if it is indulged in. A person will appreciate this, and, if the advice given, but it is the excess occurs—in other words, it is a underlying disorder, though a good man apt still to regard it as the cause of the order. It is not, of course, without it, increasing the general instability—a view established. From what has already been readily be understood that it is a quite tom in association with different types of disorder, for example, in dementia defectiveness, dementia.

HETEROSEXUAL ANOMALIES.

In these conditions sexual satisfaction is obtained by unusual or abnormal means of stimulation of the or other of the senses. By analogy the stimuli compared with the more "violent delights" of music, futurism in art, cocktails, or sensationalism in literature—though these are not regarded as such examples of moral turpitude, probably because of us are partial to them. Among these anomalies be mentioned *fetichism*, in which some object becomes the symbol of sexual attraction for the individual—a garment or a shoe; the material of which garments are made, silk, velvet, fur, the hand, the foot, or the hair—hence the hair-clipping episodes mentioned from time to time in the newspapers. Fetichism is more common in the male than in the female. Another strange perversion is that in which some part of the woman's body is painted or coloured; a quite recent case was that in which the victim was striped and

smearcd with blacking *Exhibitionism* is a display of some part of the body—usually the genitalia—with the object of gaining sexual satisfaction or of stimulating at the same time desire in others, primarily, however, it is egotistic

Other varieties are the “rubbers,” who rub against or touch the bodies of the opposite sex in public conveyances or in crowds, the “peepers,” whose methods of predilection are to watch the sexual act being performed by others or in being watched themselves, or, again, in gazing at nude figures *Bestiality* is where gratification is obtained from animals—a much more common form of perversion than is ordinarily-realized *Necrophilia* is where desire is centred on dead bodies It leads to the violating of graves, the belief in vampirism is probably to a great extent based on cases of this type

Algolagnia is the general term used to include “sadism” and “masochism” In the former, sexual gratification is accompanied by or associated with the infliction of pain It derived its name from the Marquis de Sade (1740-1814), who practised or, more profusely, preached his strange doctrines round about the time of the French Revolution, which was, in some respects, an orgy of a similar kind He was mentally unstable and, indeed, was regarded as being for a time actually insane Masochism is so called after Leopold von Sacher-Masoch (1835-1895), who wrote erotic novels, in which were described what has since been known as *masochism*, in which the person obtaining gratification plays the passive rôle and is, for example, flagellated

NONMOSFXUAL ANOMALIES

The bisexual phase in human development has been mentioned and that the normal tendency is for sexual differentiation to take place at an early stage This does not occur in a calculable proportion of the population, so that, though these individuals are ostensibly

male or female, their inclinations are towards their own sex. These are the true homosexuals. Here again, however, there is the fact that the contrary feelings are not invariably absolute, but that there is really bisexuality in some instances, though the predominant characteristic is homosexuality. So it follows that some homosexual individuals marry and give birth to children. Homosexuality is, obviously, undesirable from the biological point of view, as it is sterile, and nature has this drastic way of eliminating these, as well as other, adverse types. It must be remembered, however, that the usual implication that homosexuality is equivalent to viciousness is indefensible. That it sometimes does connote other defects in character is, none the less, true. There is, for example, the type of homosexual who is apt to pride himself on his biological errors—and this with much more sincerity than did the fox in the fable, who had suffered the loss of his tail. Such an individual does not desire sympathy in what is, nevertheless, a misfortune. On the other hand, he is in a position to point out that, in proportion to their numbers, a higher intellectual standard has been arrived at by homosexuals than by normal individuals, and he can quote as examples Sappho, Plato, Socrates, Alcibiades, Michelangelo, Benvenuto Cellini and others of great mental ability.

In addition to the true homosexual cases there are those individuals in whom the underlying bisexuality has remained in a state of unstable equilibrium, and in which it takes a "contrary" turn as a result of circumstances, or, again, as John Addington Symonds expressed it, because of "wantonness and curious seeking after novel pleasure—individuals who amuse themselves with experiments in sexual pleasure, man-jaded with ordinary sexual indulgence, and indifferent voluptuaries." He is, however, right in adding "It is possible—something morbid or abnormal marks this class." There are, too, the instances where the

individuals of the same sex live together with little or no association with the opposite sex, as in schools, convents, prisons and isolated garrisons

A special word may be said about schools—especially boarding-schools. There is no doubt of the difficulty of the problem which they present in this respect. It is the more grave in the case of those young people in whom psycho-sexual balance is wavering and where, therefore, a stimulus in the wrong direction may have a definite and lasting effect. This stimulus may be given unwittingly of all the results which may accrue by an older boy who is merely wanton or who is actually an invert. It is necessary, on the other hand, to beware of exaggerating the importance of occasional instances or of considering intense friendships between members of the same sex. Although there may be some homosexual significance in them, it is not evident even to the individuals themselves, and later on heterosexual habits become the normal attributes when circumstances alter. It is to be remembered, also, that at different epochs and in many countries friendships of the more intimate character have been regarded as commendable. This was particularly so in ancient Greece. From what has been noted regarding Plato, it is clear, also, that "platonic friendship" can by no means be regarded as one devoid of all sensuality—though that is the usual acceptation of the term. However that may be, it is certain that the normal aversion from homosexual practices is the safest guarantee against the possibility of wide extension of them.

Reference

- ¹ Gould and Pyle "Anomalies and Curiosities of Medicine,"
p. 683

The Place of X-Rays in the Treatment of Malignant Disease : With Especial Reference to Cancer of the Breast.

By F. HERNAMAN-JOHNSON, M.D., D.M.R.E.

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THE wording of the title of this article has been carefully chosen: it is at once a challenge and a disclaimer. It is a challenge because it asserts that X-rays *have* a place in the treatment of cancer; and a disclaimer, because it implies that they are not advocated to the exclusion of other forms of treatment. In any other country than Great Britain, to devote the pages of an important medical journal to such a purpose would be a waste of time, energy and printer's ink. But that the necessity exists here, a knowledge of recent events, combined with a study of the medical press, makes it only too evident. Paper after paper issues from surgical sources in which radium treatment, mostly by the burying of needles, is alone advocated—so much so that in the public mind the expression “radiation therapy” must soon come to mean this and nothing more. If, by such authors, X-rays are mentioned at all, they are mentioned disparagingly, or, worse, damned with faint praise.

Yet in every large hospital in this land the X-ray therapy departments are full of cancer cases. These departments are in charge of physicians who may be rightly termed professional radiologists, as they devote

their lives to the study of the therapeutic effects of radiation. They are essentially specialists in the application of a particular form of treatment, differing thus from "regional specialists" such as ophthalmologists or gynaecologists, and having a place in the medical profession comparable with that of the general surgeon. The foundations of our present-day knowledge of radiation treatment were laid down as a result of experience gained by these men in the use of external applications. This was true in former years not only of X-rays but of radium. Within the past decade, however, the introduction or, rather, the popularization of the method of burying radium needles, has opened up a new field for surgical skill.

When I said that the present position is peculiar to this country, I meant that elsewhere X-ray treatment is recognized as having a place in the treatment of cancer quite as important as that of surgery or radium. No less a person than Professor Regaud, Director of the Paris Radium Institute, has said in a recent address that treatment by the surgical introduction of needles or seeds is far from ideal, that efforts should be made to supersede it so far as possible by external treatment as from a "radium bomb," and that as regards such external treatment, no man can at present say whether or not the future may be with radium or with the increasingly powerful X-ray apparatus with which engineering science is year by year providing us.

Here are actual quotations from an American source: "All the available radium is needed for the type of application to which it is physically best adapted—namely, for interstitial implantation, and for use in various applications within body cavities. X-radiation should be the agent for external long distance application. . . . Viewed in this light, it is apparent that there is very little over-stepping or duplication in the fields of radium and X-rays, the two forms of radiation are very similar except for a difference in

quality (penetrating power). The nature of the source of the energy in each instance governs the adaptability. Radium is an agent for use over or within localized tumour-bearing areas, X-rays are for use over large surfaces. The two agents are complementary and not competitive. The majority of cancer cases require in their total round of treatment, surgery, radium and X-radiation. The more closely this is correlated the better." These remarks were made not by a radiologist, but by a surgeon—Douglas Quick, of the New York Memorial Hospital.¹ As a summary of the respective spheres of the two agents, they can scarcely be improved on. If I could have found a paper by an English surgeon written upon similar lines, I would gladly have quoted it. The nearest approach to it which I have been able to find in British journals does not deal with cancer but with the treatment of uterine hæmorrhage by radium or X-rays. It is by a gynæcological surgeon, Malcolm Donaldson, and sets forth the respective indications for their use with the utmost fairness.²

CANCER OF THE BREAST.

The surgical slogan, "Cancer is in the first instance a local disease," with its implied promise of cure by early operation, is at best a half-truth. For it would appear that only when the signs are so vague that exploratory operation is necessary to establish a diagnosis, are the results even of the most radical procedure at all satisfactory. Halsted, of Baltimore, claims 80 per cent of patients alive and well after five years under such circumstances. Admitting these figures, one must realize that the percentage of all breast cancer cases who are seen, or who will be seen, at this stage is pitifully small. That this should be so is in the very nature of the case—the reason being that in the majority of instances a small but definite nodule is already present when the patient consults her

doctor. The prognosis is then vastly different

Statistics on the subject vary enormously, and almost all those published have been severely criticized. Still, we shall be generous if, excluding the worst cases, we assume between 30 and 40 per cent. alive and well after five years under such circumstances. To secure an appreciable percentage of cases for radical operation at the only time when it can give really good results, it would be necessary to examine all women over thirty at intervals of not more than three months. Such a procedure is obviously impracticable, and, even could it be carried out at the behest of some medical dictator, would cause more misery in the form of apprehension than it would ever relieve. One must remember also that the inevitably small number of persons who consult a doctor for symptoms so vague that a clinical diagnosis cannot be arrived at is further diminished by the fear of a surgical ordeal coupled with the prospect of a permanent mutilation. In view of the statistics which I shall quote relative to the value of radiation treatment alone—statistics which, if sometimes open to criticism, are not more so than is the case with surgical figures—I feel it is time to assert that the radical operation is not always justified, even in these relatively favourable cases. It should be offered only as an alternative to radiation treatment. There are undoubtedly some patients whose mental peace is best secured by an immediate and radical surgical procedure, and to such it should not be denied.

Still referring to the clinically undiagnosable case, there is a further choice after operation has been rejected. It is, broadly, the choice between interstitial methods requiring surgical intervention and external radiation, though, of course, a combination of the two is possible. By external radiation I mean, in general, X-ray treatment—the sense in which Douglas Quick uses the term.

Accurate data for these very early cases—less

advanced than the ordinary Group I, which indicates a small freely movable growth and no affected glands—hardly exist. But of the Group I cases treated by X-rays alone, Pfahler of Philadelphia³ claims 68 per cent alive and well after five years, the figures for corresponding cases treated by surgery alone being 28·8 per cent. Wintz,⁴ at the Erlangen Gynæcological Clinic, claims 53 per cent. alive and well after five years in a more advanced class (Groups I and II). Douglas Webster in a small series of 20 cases—the only English report available—claims 75 per cent of “cures” at the end of three years (five-year results not given).⁵

Taking these figures in general, we find results nearly as good as those claimed by Halsted in a class of cases seen at a much earlier date. They are also rather better than the figures I have been able to find for interstitial radium treatment alone. For this, Burton J. Lee of New York gives 62 per cent free from disease after five years in Group I.⁶

Why, then, should we subject a patient to a needless operation, with its inevitable trauma of the primary growth, when we have every reason to believe that external treatment will accomplish results equally as good? Remember that I speak of patients who (1) may not have cancer at all, (2) who have no definite palpable tumour, and therefore no definite localizing signs to indicate where radium needles should be placed. Needles can, if it is thought desirable, be implanted in what may be called the routine sites—axilla, root of neck, etc. The chances that these areas are already infected is slight, and consequently the risk from trauma is negligible.

Of all the statistics I have been able to collect, those of Pfahler and Widmann (*loc. cit.*) are the best as regards survival figures. It is not necessary to go into details of technique in an article of this kind, but it may be said that Pfahler administers a certain initial dose of X-rays and aims at keeping up the

full effect by a series of graded subsequent doses, he calls this the "saturation method." He divides his cases into the usual three groups, which he details as follows. Group I, no glands affected, growth freely movable; Group II, axillary glands affected, growth adherent to skin; Group III, axillary glands affected, often also infraclavicular, growth adherent to the skin and muscle. In Group I he states that 68 per cent are alive and well after five years, and 46 per cent alive out of Groups II and III (separate figures for these groups are not given; but for Group III alone Wintz gives 12 per cent alive after five years)

Taking a general view of the statistics, we find that in all cases except those seen so early that a clinical diagnosis cannot be made, the survival figures for treatment by X-rays alone are vastly superior to those for radical operation alone, and I venture to say that it is unlikely that they will be bettered by those for interstitial radium treatment

If it be objected that practically all the figures quoted are from abroad, I can only say, in the first place, that this is no reason for not accepting them, if they were surgical figures they would be accepted, if offered by men of corresponding standing in the world of surgery. And, in the second place, it has not, up to the present time, been possible for radiologists here to get early cases for X-ray treatment alone. The older amongst us, brought up in the strict surgical tradition of the early part of this century, would, indeed, have hesitated to accept such cases even if they had been thrust upon us

My own position, which is no doubt that of many English radiologists, is a somewhat illogical one. Intellectual belief would lead one to advocate X-ray treatment alone, if we could be sure of repeating Pfahler's results, none of us would hesitate. It has been said that "The good is the enemy of the best,"

and this applies to X-ray practice in this country. Now, the results of X-ray treatment, pre- and post-operative, in conjunction with conservative surgery are undoubtedly good. They are, in my opinion, better than when radical operation is combined with X-ray therapy. In this opinion I am not alone. Burton J. Lee, in the paper previously referred to, says "Irradiation with conservative surgery justifies itself as a therapeutic method of dealing with this disease, and each form of therapy should receive its due proportion of credit for the results obtained. The combined therapy has yielded better percentage of figures in Grade A than was obtained by radical operation with radiation." The figures referred to are 62 per cent. alive and well after five years—exactly the same figure as for the New York Memorial Hospital cases treated by radium alone.

I think that in this country at the present moment this is a sound policy for the X-ray therapist to follow—to advocate pre-operative irradiation, surgical removal of resistant remainders, and subsequent X-ray treatment at intervals over a prolonged period. That it is a practical policy I have proved in my own work, both private and hospital. It is true that the interpretation of "conservative measures" varies between surgeon and surgeon: some remove the whole breast, others only obvious lumps. Still, the procedures on the whole are much less extensive than was the case a few years ago; and in such matters, at any rate in England, *festina lente* is the only possible motto.

In the early part of this article I quoted Regaud of Paris as saying that the surgical introduction of radium is not an ideal procedure. Some people, I gather from their writings, seem to think it is desirable in itself as "it delivers a lethal dose where it is most needed." I am interested to see this idea of the lethal dose cropping up again in surgical literature, as it has practically disappeared from the vocabulary of the

X-ray therapist. There is no such thing as a lethal dose of radiation short of the production of a general radio-necrosis. If this statement is not true, it should be possible, after thirty years' experience, to sterilize such a readily accessible tumour as a basal cell epithelioma (rodent ulcer). While this can apparently be done in the great majority of instances, there is no certainty about it in any individual case, no matter what the quantity or quality of the dose, and irrespective of whether radium or X-rays are used. On the other hand, many rodent ulcers heal and remain healed after quite small repeated doses of X-rays, without visible reaction. They may also be caused to heal in some cases by the high frequency spark (not cautery) or by ultra-violet rays. Small X-ray doses and the other agents mentioned must act by the stimulating of normal rather than by destruction of abnormal tissues.

I venture to prophesy that the term "lethal dose" will become as rare in the literature of radio-surgery as it now is in X-ray literature. It will be found that no matter what dose of radium is used, and no matter how it is distributed in space and time, it will never be possible to say that, in any given case, all cancer cells have been destroyed. I make this assertion with the more confidence in that it is but a repetition of what I said with regard to "killing a cancer" by deep X-rays, when they were at the height of their boom eight or nine years ago.

I should be very sorry if anything I have said should be taken as casting doubt upon the value of the surgical introduction of radium needles in breast cancer. I have already pointed out that the available figures show great improvement on those of radical operation alone, are equal to those for X-rays *plus* conservative surgery, and are strikingly bettered only by those given by Pfahler for his saturation X-ray method. Nevertheless, one sees the implantation method repeating the history of the purely surgical attack, which culminated

in the operation associated with the name of Halsted. First of all, more and more extensive needling of the breast itself; then treatment of the axillary glands, supraclavicular region and intercostal spaces; and finally of the substernal glands. The ultimate result must be an operation almost as difficult and extensive—if, fortunately, not so mutilating—as radical excision itself. From the patient's point of view, such a form of radium treatment is already associated with an anæsthetic and a prolonged stay in a nursing home. For the nervous patient, much of the value of radiation treatment is being lost. In other words, the tendency to concealment will scarcely be reduced.

Anyone who has made a study of breast cancer and of the treatment by surgery and radiation, must ask himself whether any conceivable distribution of radium needles can secure destruction of all malignant cells over an area where superficies has not alone to be considered, but also depth? Is it possible to block the whole lymphatic path? or rather the multiple paths? And even if it were, are we really sure that this is the only means of spread? What of the metastases, which in some instances seem to spring up throughout the body like overnight mushrooms in a field? The breast cancer patient is never cured. Lip service is paid to this truth by all; but, in practice, the surgeon who buries radium, no matter how extensively, and takes no further measures to help his patient, is disregarding it just as much as his predecessor who pinned his faith to radical operation alone.

Attempts to show that X-rays are not of value because a so-called "sterilizing dose" cannot be administered to every cancer cell display ignorance of fundamental principles. Quite small doses will often cause cancerous nodules to disappear, just as they will produce healing of a rodent ulcer. This they do, in my opinion, by stimulating resisting power, local and general, rather than by direct attack on cancer cells,

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growth, with some consequent risk

In my opinion every breast cancer case should have a short course of X-rays, widely distributed, at least once every twelve months for many years, if not for the rest of her life. In addition, some heavy localized doses of deep X-rays should be used at longer intervals on sites where occurrence is most likely—the axilla and the root of the neck. Then there is the question of general health. No one who has had much to do with breast cancer can doubt that general resistance plays an important part in holding the disease in check; and when resistance seems on the point of collapse, it may sometimes be assisted by psychical or physical means. Among the latter, ultra-violet light is extremely valuable. It has no local action on nodules, but it may have a remarkable effect on the patient's general well-being, and may restore her power of response to X-ray treatment when this had seemed to be exhausted. This experience of mine is also that of workers at the Cancer Hospital.

Throughout this country there are scores of well-equipped hospital X-ray departments which deal, in the aggregate, with thousands of malignant cases every year. These are nearly all cases which have been abandoned by everyone else except the professional radiologist. Dr. Woodburn Morrison, Professor of Radiology in the University of London, in his presidential address to the Electro-therapeutic Section of the Royal Society of Medicine,⁸ made the following remarks regarding the work of such departments. "In the treatment of malignant disease, I have often said that the existence of such departments could be justified by the failures . . . Inoperable cases are guarded and cared for through a long and trying period, trying not only to the patient, but to the patient's friends. Life is made easier and brighter, the pathway is made smoother. You may call it a failure, but viewed in another light, it may be your greatest success." True

words; but if there are to be successors to the existing generation of radiologists, X-ray workers must be allowed to exercise their art upon other than hopeless or nearly hopeless cases. Even as it is, apparent miracles are sometimes performed; and if they are relatively few, in actual numbers they are considerable.

To discuss in detail the place of X-rays in the treatment of other forms of malignant disease is, of course, impossible within the limits of the space available to me here. Some brief statements must suffice. Cancer of the parotid responds well to X-rays, as also does that of the thyroid. Sarcomata, if caught at an early stage, often do remarkably well. I have several cases, microscopically confirmed, alive and well after periods of from one to three years. Radium burying in such cases I believe to be quite unjustifiable. In operable carcinoma of the cervix uteri, treated by radium alone, the survival figures are: for Paris, 25.8 per cent. alive after five years; Stockholm, 46.2 per cent.; at Erlangen, where X-rays are chiefly depended on, 57.4 per cent. The latter figure is definitely better than the best of the statistics for radium alone. It is true that Wintz states that in the case of very obese patients he uses radium internally as well, but this does not detract from the unpressiveness of the figures, it merely illustrates the value of combination.

Challenges are sometimes issued to British radiologists to produce similar figures, but no X-ray worker in this country has had an opportunity of treating a series of operable cases. On the other hand, many almost miraculous restorations to apparent health stand to the credit of radiologists in cases dying from inoperable or recurrent carcinoma of the uterus with widespread pelvic invasion. I have myself both published such cases and demonstrated them at clinical meetings, and at various times and places my colleagues have done likewise. That such patients,

after leading a normal life for one or two years, suddenly go to pieces, detracts nothing from the marvel of their restoration.

The extensive surgical procedures associated with the employment of radium are, I believe, already frightening the public, who are beginning to ask if in all cases they are necessary. If the statistics which I have quoted are fact and not fiction, the time will come when the radiologist will be as likely as the surgeon to see malignant cases at first hand. If this seems a wild prophecy, let me call attention to what is already happening in the matter of the treatment of excessive uterine hæmorrhage, at or near the menopause. The general practitioner and the consulting physician have learned that in women approaching middle age, an artificial menopause can be safely and easily brought about by X-ray treatment without the necessity for any internal manipulation, without a single day's sojourning in a nursing home or any interference with normal life. The result is that an increasing number of such patients are sent direct to the radiologist.

I wish to acknowledge the valuable help given to me by my colleague, Dr A. Orłowski, assistant radiologist to the French Hospital, in obtaining statistics from foreign sources.

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A Satisfactory Ambulatory Method for the Treatment of Gastric Ulcer.

By NOEL HYPHER, BSo, MRCS, LRCP, DMRE
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IN the medical treatment of gastric ulcer it is usual to put the patient to bed for a period averaging four to six weeks, diminish the quantity of food, prescribe a bland diet and an alkaline mixture, and when an apparent cure has taken place to let the patient enter upon an ambulatory stage of treatment. It is, however, very difficult to get all patients to give up their work and take to bed. In some walks of life people holding responsible positions insist upon carrying on their employment at all costs, and the practitioner is faced with the problem of devising an entirely ambulatory method of treatment. It is orthodox teaching at the present day to insist upon a preliminary treatment in bed, and as an example I quote Bolton, who says: "It is perhaps better for the patient if he bleeds, for then bed is a necessity; even in such cases one not uncommonly sees patients who have only been in bed for one or two weeks"¹ As enforced confinement to bed is irksome to the patient, may involve a loss of income, and is usually an added expense, the satisfactory treatment of gastric ulcer by an entirely ambulatory method should be of interest.

The two cases described in this article were cases of chronic gastric ulcer, unsuccessfully treated (one by an ineffective surgical operation). Both patients

were examined in hospital and X-rayed, and were awaiting re-admission for operative treatment. These patients had likewise had recent experience of abdominal operations and came to me in despair, much after the manner of the condemned criminal who approaches his solicitor in the hope of obtaining a reprieve.

Case 1—E G B, an ex-policeman, aged 49, first had periodic bouts of indigestion, occurring after meals, in February 1925. In January 1926 the pain and vomiting were severe enough to cause him to leave work, in spite of medical treatment by his doctor. In April 1926 an X-ray examination showed "an old standing ulcer on the lesser curve." On May 25, 1926, a gastro-jejunostomy was performed. The patient passed through the years 1927, 1928 fairly well, but in December 1929 the epigastric pain returned with even greater intensity, radiated to the back, and became continuous in character. On January 30, 1930, the X-ray examination revealed a large niche in the mid-gastric region towards the posterior surface.

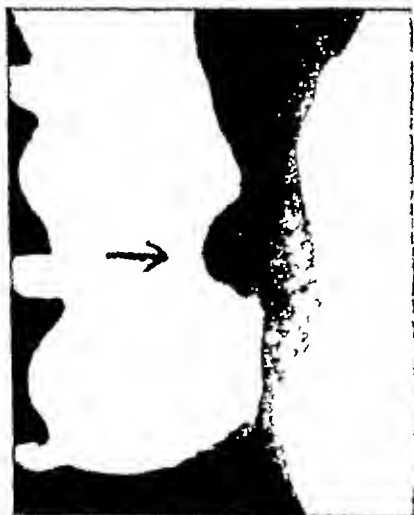


FIG 1—E.G.B. X-ray of ulcer niche on 30.1.30

FIG 2—Complete disappearance of ulcer niche two months after instituting treatment

On February 26, pending admission to hospital, the patient came to me for treatment. He was already on a bread and milk diet, which I advised him to continue. I then prescribed a heavy alkali mixture (to be described later). Under this treatment pain was abolished in a week, and he stated that he was quite comfortable. In the meanwhile I arranged with Mr. Walton for his admission to the London Hospital. On March 21 he was X-rayed by Dr. G. E. Vilvandre at the London Hospital at Mr. Walton's request, and Dr. Vilvandre reported that the X-ray showed a perfectly acting

the following mixture —

℞				
Bismuth carb	-	-	-	grs xv
Mag carb lev	-	-	-	grs xv
Calc carb	-	-	-	grs xv
Emuls chlorof	-	-	-	m x
Mucil tragacanth	-	-	-	q s
Aq ad	-	-	-	℥ss or ʒi

To be taken with water every four hours (half an hour after meals). A dose is to be taken at night if the pain rouses him. When the pain is abolished (usually after the first week), the mixture is to be taken every four hours four times a day. At the end of a month the mixture can be taken three times a day. The diet is gradually modified week by week, by the addition of eggs, fish, custard, meat, and cereals, until after a month the patient is on a normal diet. The dose of the mag carb. lev. is to be diminished if there is a tendency to diarrhoea. There is no danger of alkalosis, and medicinal treatment can be continued indefinitely without the development of untoward symptoms.

It will be noticed that the mixture contains heavy alkalis kept in a state of suspension by mucilage tragacanth. The object of keeping the insoluble salts in suspension is to bring them in contact with the ulcer even whilst standing in the erect position. The various carbonates settle out on the surface of the ulcer and exert their neutralising and protective qualities. Where no mucilaginous agent is used heavy salts tend to fall quickly by gravity to the greater curvature of the stomach, thus missing ulcers which may be present high up or midway on the lesser curve. This phenomenon is well known to all radiologists, and mucilage tragacanth or gum arabic is employed in the preparation of barium meals for X-ray examination with the object of facilitating the deposition of barium sulphate on all parts, including the cardiac end of the stomach.

I hope through the further application of this method by others to learn of similar medical successes con-

firmed by radiological examination. Statistics of cures in general practice are very difficult to obtain and it is in general practice that ambulatory methods are most frequently employed. Every case treated in general practice should be X-rayed before the commencement of treatment and after the entire disappearance of symptoms. It is by X-ray examination that the presence of carcinoma of the stomach, or the occurrence of carcinomatous change in a gastric ulcer is excluded. The frequent mistake of treating an operable carcinoma of the stomach by alkali methods till an inoperable condition is produced would thus be avoided.

I have to thank Mr. A. J. Walton for admitting and investigating Case 1, at the London Hospital. It is also my privilege to thank Dr. P. J. Briggs, radiologist to King Edward VII Hospital, Windsor, and Dr. G. E. Vilvandre, radiologist to the London Hospital, for their repeated independent examinations of my patients.

Reference.

- ¹ Bolton, C. "The Relation of Medicine to Surgery in the Treatment of Gastric and Duodenal Ulcer," *Brit Med Journ*, 1930, 1, 727.

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Calc carb	-	-	-	grs xv
Emuls chlorof	-	-	-	m x
Mucil tragacanth	-	-	-	q s
Aq ad	-	-	-	3ss or ʒi

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Practical Notes.

The Pre-natal Treatment of Syphilis.

V J Wile and J W Shaw are emphatic that the pre-natal treatment of early syphilis results in a marked decrease in the foeticidal effects of the disease. A slightly higher percentage of syphilitic babies occurred in the group investigated by the authors than has been recorded by others. This higher figure is readily accountable to the earlier age and the activity of the syphilis in the authors' series. Salvarsan is well tolerated by pregnant women, and there is no apparent relationship between the intravenous administration of the drug and miscarriage or abortion. Pre-natal treatment modifies definitely the syphilitic changes in the placenta. Regardless of the absence of clinical or serological observations, it seems wise to treat babies born of mothers in whom the syphilis is early, to supplement the pre-natal treatment of the mother — (*Journal of the American Medical Association*, vol xcv, no 24, December 13, 1930, 1791)

The Treatment of Hepatic Syphilis

O'Leary, mainly on the results of treating thirty-one cases in which laparotomy for intercurrent disease had enabled the syphilitic lesions in the liver to be accurately determined, gives very definite directions about the treatment with, on the one hand, salvarsan preparations, and mercury and iodides on the other hand. The three forms of late hepatic syphilis are diffuse hepatitis, gummatous change, and cirrhosis, the last being a terminal stage and the result of injury by other factors, such as infection, alcohol and arsenic. Expectancy of life is longest in the gummatous form, next in the diffuse hepatitis, and shortest in cirrhosis. The gummatous form reacts well to salvarsan preparations, but it may be combined with diffuse hepatitis, and as a general rule cases of hepatic syphilis should be treated first for six months with mercury and iodides. The continual use of mercury and iodides at intermittent periods for several years has given an expectancy of life three times greater than that in patients treated by intensive salvarsan and mercury. The treatment of syphilitic cirrhosis is on the whole unsatisfactory. Early recognition of hepatic syphilis and avoidance of forms of treatment which may produce hepatic injury are the essential factors in the management of the disease — (*Proceedings of the Staff Meetings, Mayo Clinic*, 1930, v, 191)

The Causes of Late Syphilis

J F Madden, as a result of the study of five hundred cases of late syphilis, comes to the conclusion that by far the most important factor in the cause of late manifestations of syphilis is the lack of or

inefficiency of treatment during the early stages of the disease. Only two out of the total of 500 cases had anything like energetic treatment during the first year, even in these two the rationale of the treatment was open to question. The choice of drugs, their method of administration, the amount and length of time the drugs were given, all point to inadequate training on the part of the practitioner. It is suggested by the author that more time should be devoted in medical schools to the diagnosis and treatment of syphilis — (*American Journal of Syphilis*, vol. xiv, no. 1, October, 1930, 451.)

The Mechanism of the Wassermann and Precipitation Tests for Syphilis.

H. Eagle publishes an explanation of the mechanism of the complement fixation and precipitation tests used in the diagnosis of syphilis based upon the underlying physico-chemical reactions involved. There is, he says, not merely a superficial similarity between the flocculation tests for syphilis and bacterial agglutination by an antiserum, or between the Bordet-Gengou phenomenon (specific complement fixation) and the Wassermann test. The analogy extends to the basic mechanism of the reactions. Reagin, an altered globulin in syphilitic serum, combines with the colloidal particles of beef-heart lipid ("antigen"). The surface film of protein thus formed sensitizes the particles to flocculation by electrolyte (Sachs, Georgi, Kahn, and others), and also adsorbs complement (Wassermann). Antibody globulin affects bacteria, red cells or foreign protein in exactly the same manner. The serum change characteristic of syphilis may therefore well represent an antibody response to products of infection. As will be shown, the fact that normal-tissue lipoids can be used instead of spirochetes as the antigen in the test-tube reaction does not exclude this possibility. — (*Bulletin of the Johns Hopkins Hospital*, vol. xlvii, no. 5, November, 1930, 292.)

The Treatment of Vulvo-vaginitis in Children.

Kathleen Brown reviews the subject of vulvo-vaginitis in children, based on a five year period study of children attending the female V.D. Clinic of Guy's Hospital. She points out that from the numerous methods of treatment advocated by different authorities it is evident that there is no single infallible 'cure' for gonorrhoea in children. Some children will clear up rapidly with whatever method is employed, while others prove so resistant that one almost has to wait in despair for the child to "grow out of it." The treatment employed at Guy's Clinic varied: (1) Spuitan was used either alone or with propargol 10 per cent. in glycerine in a large proportion of cases. (2) Mercurochrome 10 per cent. emulsion of sulphur, or acriflavine 2 per cent. were also used as local applications. (3) Irrigations with potassium permanganate 1 in 10,000. Glauramine, dibromine or gollucide 3 per cent. were used in some of the earlier cases with bougies of colloidal argenticum, protargol or glauramine. The general health was maintained by means of tonics or cod liver oil whenever indicated. Home treatment was carried out by Sitz

births Vaccines, either detoxicated or stock, were given in 11 cases, three cases who relapsed five times each received a course of detoxicated vaccine at the commencement of the disease Each case was admitted to the ward, so that conditions were most favourable to treatment The average duration of treatment for 28 cases who attended regularly was 15 weeks The minimum period was one week, and the maximum 45 weeks Daily attendance was the general rule for the first few weeks, and later alternate days or twice weekly —(*British Journal of Venereal Diseases*, vol vi, no 4, October 1930 285)

Villous Growths of the Rectum

In an article illustrated by ten coloured drawings of the appearances to the sigmoidoscope and ten black and white drawings mainly of the histological structure, Bensaude, Cain, and Lambing describe the features of villous tumours of the rectum, from an experience of 59 cases They draw a very definite distinction between them and the ordinary rectal polypi, and point out that they are more frequent than is usually thought They occur almost exclusively in persons over 40 years of age, run a prolonged course, pain being usually absent and hemorrhages slight and occasional Constipation, on which other authors have insisted, is in reality far from constant, and a characteristic feature is the pseudo-diarrhoea caused by a discharge of glairy mucus, like white of egg or gum, which necessitates many calls to stool In rare instances the tumour prolapses through the anus, the tumour may undergo fragmentation, pieces being discharged repeatedly with defaecation, in one case 106 fragments the size of a small pea were discharged in the course of nine months Malignant transformation occurs in 45 per cent of the cases Treatment by radium, electro coagulation and fulguration is unsatisfactory, and surgical removal per rectum or when necessary by rectal resection by the perineo coccygeal route is recommended Local and general anaesthesia do not relax the sphincter sufficiently, and accordingly spinal anaesthesia is necessary —(*Presse médicale*, Paris, 1930, December 17, 1713-19)

The Dietetic Treatment of Tuberculosis

B Köhler reviews the various diets which have been advised for tuberculous patients and refers particularly to that of Gerson which consists in a strict limitation not only of animal proteins, but also of vegetable proteins, such as fruits and vegetables, with complete abstention from salt The carbohydrate and fat content of the diet is greatly increased and large quantities of vitamins are given Köhler has come to the conclusion from an analysis of over two hundred cases of tuberculosis seen in the Munich Surgical Clinic that the main essentials of a diet suitable for tubercular patients are the presence of mineral salts, large quantities of vitamins B and D and the administration of cod-liver oil A diet containing these essentials may be modified at the discretion of the physician to suit individual cases The best results from this diet were seen in cases of bone and joint tuberculosis and in tuberculosis of the viscera,

inefficiency of treatment during the early stages of the disease. Only two out of the total of 500 cases had anything like energetic treatment during the first year, even in these two the rationale of the treatment was open to question. The choice of drugs, their method of administration, the amount and length of time the drugs were given, all point to inadequate training on the part of the practitioner. It is suggested by the author that more time should be devoted in medical schools to the diagnosis and treatment of syphilis — (*American Journal of Syphilis*, vol. XIV, no. 4, October, 1930, 451.)

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Reviews of Books.

Deep X-Ray Therapy in Malignant Disease A Report of an Investigation carried out from 1924-1929, under the Direction of the St Bartholomew's Hospital Cancer Research Committee, by WALTER M LEVITT, M B, D M R E St Bartholomew's Hospital Reports, Supplementary Volume, 1930 London John Murray Pp xiv and 128, figs 10 Price 10s 6d

THE Cancer Research Committee, under the chairmanship of Sir Thomas Horder, consisted of sixteen members, representing the various aspects of medical science and art. A special department for radiological research was established and financed by various donors. This report of the work done covers an extensive field, namely, the technique of deep X-ray therapy, of cases treated by X-rays in combination with radium, and of the cases treated in collaboration with the Lead Research Department, the management of the cases, the constitutional effects of the treatment, and the results. The parts of the body in which malignant disease was treated were the breast, uterus, upper air-passages, oesophagus, thyroid and rectum. Altogether 327 patients were treated, four of whom might be regarded as succumbing as the result of the treatment, mild X-ray sickness was almost constant, but the severe forms were not encountered. Good results were more frequent in malignant disease of upper air-passages, uterus and breast than of the rectum and oesophagus. Dr Levitt must be warmly congratulated on this valuable report.

Surgical Emergencies in Practice By W H C ROMANIS, F R C S, F R S E, and P H MITCHNER, M S, F R C S London J and A Churchill, 1931 Pp 608, figs 155 Price 18s

WRITTEN in vigorous style and expressing the views of the authors over the wide field of the title, this book should prove of great value to hospital residents and others confronted by surgical emergencies, to whom we heartily commend it. Personal views are freely expressed and often provocative, but in compensation the authors have discarded legend and archaic matter. With the treatment of acute appendicitis commended when forty-eight hours or more have elapsed since the onset, the reviewer is in complete disagreement, holding the policy of delay to be wrong, no reference is made in the text to the unfortunate members of the "unsuccessfully postponed" group to which reference was made by the late Mr Adams of the authors hospital. He views with almost equal disfavour the advocacy of a large incision "so as to be able to turn out the cæcum," a disruptive practice often to be avoided by the skilful surgeon. A small scar is evidently and most improperly considered to indicate a wrong diagnosis, though absence of diagnosis is surprisingly condoned in the section on salpingitis, where it is stated that owing to uncertainty "laparotomy is usually performed". There is some lack of correspondence between text and figures, especially among the whitlows, and for what condition the operative laceration of a nail-bed depicted on p 68 is designed, is neither apparent nor explained. Measures are unsystematic—sod cit, grs x are to be dissolved in 30-50 c cm

of water. The dietary for recent gastro enterostomy—black coffee and Bovril immediately, with "mutton and ordinary food" ten days later—is something more than contentious. Revision has failed to prevent whole pages from being later repeated verbatim, as in the cases of alveolar abscess and quinsy. The sections on anthrax, amputations, and nerve injuries, are especially good, as is that on empyema and lung abscess, which is again contentious though authoritative. Illustrations are fair and usually helpful—there are none of the usual portraits of sterile nailbrushes—and the radiograms, which are many, are beautifully reproduced as negatives.

Emergency Surgery By HAMILTON BAILEY, F.R.C.S. Volume I
Abdomen and Pelvis. Bristol: John Wright & Sons, Ltd.,
1930. Pp. 380, illustrations 324. Price 25s.

THIS further publication of Mr Hamilton Bailey's adequately fulfils the object of its writer. Written in a clear and concise form it should prove an invaluable addition to the library of the isolated surgeon who may be called upon to deal with any case of "acute abdomen." The book exhausts the many and varied types of acute cases, and although it indicates the modes of treatment most successful in the hands of the writer, it discusses alternative means of therapy and approach. Covering a wide experience of acute surgery, the book enables one to apply a tested method of treatment for most cases without exhaustive reference. The use of a "grid iron" incision for purposes of exploration does not meet with general acceptance as a means of investigating an abdominal catastrophe. The inadvisability of supplementary interference beyond closure of the perforation in cases of 'perforated ulcers' might be more stressed in view of the present trend of opinion. The advice as regards the restriction in the number of instruments applied to every day surgery is a point of considerable value, the tendency of many surgeons being to depend on too many specialized instruments of restricted utility. The chapters dealing with injuries of the urinary tracts deserve special commendation. The illustrations are instructive and excellently reproduced.

The Treatment of Asthma By A. H. DOUTHWAITE, M.D., F.R.C.P.
London: H. K. Lewis and Co., Ltd., 1930. Pp. viii and 164.
Price 7s. 6d.

THIS handy book gives a well written summary of the present state of the asthma problem and provides recent observations made by Dr G. M. Oriel and others connected with the Asthma Research Council. It is divided into two parts, the first deals with asthma as seen in clinical practice and as judged by the laboratory worker, the second part deals with the various methods of treatment and is unbiased and full of common sense. No panacea is held out, the elimination of septic foci rarely gives striking results, specific and non-specific desensitization is usually disappointing, and the scope for active therapy, diathermy, X-rays, and psycho-analysis is very limited. Most drugs do not do more than relieve symptoms, but more perhaps may be ascribed to calcium and irradiated ergosterol, and to glucose and ammonia.

Physical exercises and massage are seldom employed but, though not a cure, are valuable in delaying the onset of structural changes and lengthening the inter-paroxysmal periods

The Diagnosis of Mental Deficiency By HENRY HERD, M A, M D
London Hodder and Stoughton, Ltd, 1930 Pp 275 Price
12s 6d

THIS book is intended as a handbook principally for school medical officers and others who may be called upon to certify children under the Education and Mental Deficiency Acts. There is no doubt of the necessity for exacting a high degree of efficiency in dealing with such children. The assessment of the degree of mental defect is no affair for the occasional amateur but requires considerable experience, and while this book will certainly help those desiring a competent knowledge of the subject, it cannot be too much emphasized that only considerable experience produces reliability in this matter. In two directions the scope of the book is somewhat narrowed. Its concern is entirely with the intellectually defective child. Children whose difficulties depend on other factors are dealt with only incidentally, and in association with that unfortunate legal category, to which the author rightly takes exception, the moral imbeciles. Yet these other difficulties do give rise to problems of differential diagnosis in relation to just such cases as those with which this book is concerned. The other limitation is with regard to the rather academic type of psychology, which Dr Herd finds useful, and which on the whole is applicable only to cases of straightforward intellectual defect. It is interesting to note that where Dr Herd finds the educational age lagging behind the mental age, he regards it as another evidence of defect and attributes it to the child and not to the educational system. He does not sufficiently explain that such an assessment may do injustice to the child. No mention is made of the Merril-Palmer tests for children of pre school age. Apart from these points the book is up-to-date and should be very serviceable.

Hypertension By LESLIE GAGER, M D, Clinical Professor of Medicine, George Washington University London Baillière, Tindall and Cox, 1930 Pp xiii and 158, figs 5 Price 13s 6d

UNDULY raised blood pressure without causal renal disease has now an enormous literature, from which Professor Gager has selected five hundred references to fortify his excellent survey of the whole subject. A book of this kind demands much labour, and the author pleasantly dedicates it to his wife as a tribute to her endurance while it was being written, and confesses that for two years he may have been a burden as persistent as high blood pressure to the staff of the Surgeon-General's library at Washington. In this valuable source of reference there is a freedom from the crude dogmatism which sometimes finds expression in the hurried publications of those with a limited knowledge and experience. The crux of the problem of hypertension lies in the increased activity and tone of the muscle cells of the arteriole, and the speculative question of a remedy for hypertension analogous to insulin in diabetes is raised. The bad

effects of abruptly lowering the pressure in well-established cases is recognized, and the view that the raised pressure is compensatory is left open. An account is given of the numerous remedies employed, including potassium sulphocyanate, which the author has used extensively and successfully.

The Chest in Children, Roentgenologically considered Annals of Roentgenology Volume XII By E GORDON STOLOFF, M D New York Paul B Hoeber, Inc, 1930 Pp 432, 406 Roentgen ray studies and 19 clinical illustrations Price 15 dollars

THIS is the twelfth in the series of elaborate monographic atlases of Roentgenology edited by Professor J T Case, of the North-Western University Medical College, Chicago. Dr Stoloff holds the posts of paediatrician and radiologist in two hospitals in New York, and thus is exceptionally well qualified to correlate clinical observation with radiological research in the diseases of the chest in children. The result is a most valuable source of reference for information, not only on common conditions, such as tuberculosis, but on rarities, for example, the infiltration of the lungs, simulating generalized bronchopneumonia, in essential hypoid histiocytosis (Niemann-Pick disease). Tuberculosis of the lungs is divided into three stages: primary, in the pulmonary alveoli, secondary, involvement of the regional lymphatic glands, and tertiary, or the adult form occurring in childhood, spoken of as a juvenile phthisis. The wealth of illustrations in the text is shown by their number almost equalling that of the pages.

Male Disorders of Sex By KENNETH M WALKER, FRCS London Jonathan Cape, 1930 Pp 191 Price 5s

ALTHOUGH disorders of sex may be ranked among the minor ailments, the patients who suffer from them are among the most miserable a practitioner is called upon to treat. To the young practitioner, then, seeking some guidance in this morass, the blunt honesty of Mr Kenneth Walker and the positive help which he gives in this little book, should prove a god-send. As regards impotence, Mr Walker is of opinion that psychological treatment is the first on which the whole treatment of the condition revolves, and that even when an organic lesion exists the psychological handling of the patient is of prime importance. Testicular grafting is essentially a means of remedying deficiency, but in suitable cases and with a proper technique, the results are sometimes, Mr Walker considers, extremely satisfactory, bearing in mind that at the best a testicular implant can only have a life of three to four years' duration. With regard to vaso ligation, the author believes that any success it has is by suggestion rather than through any physical change produced in the organs of sex. The attitude of the medical profession to childlessness in marriage has undergone a radical change in the last twenty years, and the practitioner no longer starts with the assumption that the wife is to blame. An attempt to assess the responsibility of the male is fraught with great difficulties, for the statistics of authorities vary enormously, but the author's conclusions carry the weight of wide experience.

Preparations, Inventions, Etc.

PEPTALAC

(Guildford, Surrey Messrs Cow and Gate, Ltd)

Messrs Cow and Gate have been experimenting for the past two years on peptonised milks, and as a result of their researches, have now introduced a new product called peptalac. Peptalac is prepared from full cream milk and wheat flour, each of which is peptonized under optimum conditions and then powdered by the improved roller process. In the antiquated methods of peptonizing, time, patience and skill were demanded in the preparation of the food. In peptalac, the simple addition of hot water to a powder gives a milk-food in which the proteins and starch have been sufficiently predigested. Peptalac is very palatable, and is indicated in all forms of indigestion and gastric disease. It is also an admirable means of introducing a starch food to infants, as reconstituted peptalac is free from pathogenic organisms and practically sterile.

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effects of abruptly lowering the pressure in well-established cases is recognized, and the view that the raised pressure is compensatory is left open. An account is given of the numerous remedies employed, including potassium sulphocyanate, which the author has used extensively and successfully.

The Chest in Children, Roentgenologically considered. Annals of Roentgenology. Volume XII. By E. GORDON STOLOFF, M.D. New York: Paul B. Hoeber, Inc., 1930. Pp. 432, 106 Roentgen-ray studies and 19 clinical illustrations. Price 15 dollars.

THIS is the twelfth in the series of elaborate monographic atlases of Roentgenology edited by Professor J. T. Case, of the Northwestern University Medical College, Chicago. Dr. Stoloff holds the posts of paediatrician and radiologist in two hospitals in New York, and thus is exceptionally well qualified to correlate clinical observation with radiological research in the diseases of the chest in children. The result is a most valuable source of reference for information, not only on common conditions, such as tuberculosis, but on rarities, for example, the infiltration of the lungs, simulating generalized bronchopneumonia, in essential lipoid histiocytosis (Niemann-Pick disease). Tuberculosis of the lungs is divided into three stages: primary, in the pulmonary alveoli, secondary, involvement of the regional lymphatic glands, and tertiary, or the adult form occurring in childhood, spoken of as a juvenile phthisis. The wealth of illustrations in the text is shown by their number almost equalling that of the pages.

Male Disorders of Sex. By KENNETH M. WALKER, F.R.C.S. London: Jonathan Cape, 1930. Pp. 191. Price 5s.

ALTHOUGH disorders of sex may be ranked among the minor ailments, the patients who suffer from them are among the most miserable a practitioner is called upon to treat. To the young practitioner, then, seeking some guidance in this morass, the blunt honesty of Mr. Kenneth Walker and the positive help which he gives in this little book, should prove a god-send. As regards impotence, Mr. Walker is of opinion that psychological treatment is the first on which the whole treatment of the condition revolves, and that even when an organic lesion exists the psychological handling of the patient is of prime importance. Testicular grafting is essentially a means of remedying deficiency, but in suitable cases and with a proper technique, the results are sometimes, Mr. Walker considers, extremely satisfactory, bearing in mind that at the best a testicular implant can only have a life of three to four years' duration. With regard to vasectomy, the author believes that any success it has is by suggestion rather than through any physical change produced in the organs of sex. The attitude of the medical profession to childlessness in marriage has undergone a radical change in the last twenty years, and the practitioner no longer starts with the assumption that the wife is to blame. An attempt to assess the responsibility of the male is fraught with great difficulties, for the statistics of authorities vary enormously, but the author's conclusions carry the weight of wide experience.

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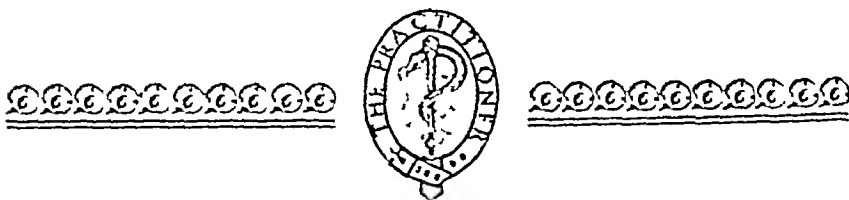
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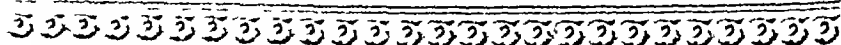
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WHOLESALE COMMODITY PRICES AND COST OF LIVING

PROBLEM OF WIDE AND INCREASING DISPARITY

ADDRESS OF THE HON RUPERT E BECKETT

THE Annual General Meeting of the Shareholders of the Westminster Bank Limited was held on Wednesday January 25th, at the Head Office, Lothbury, F.C. The Hon Robert E. Beckett (Chairman) presided.

The Chairman, at the outset referred to the retirement from the Chairmanship of Mr R Hugh Tennant, who he said had decided to take some measure of relief after a service of close upon four years in that capacity. Mr Tennant would retain his seat on the Board so that his outstanding abilities would not be lost to the Bank. Sir Malcolm Hoag had been appointed a Deputy Chairman to serve with Sir Montagu Turner. Having alluded to other changes in the personnel of the Board, the Chairman mentioned that he had to record the retirement on September 30th last from the position of Chief General Manager of their Co-Director, Mr John Rae. Mr Rae retained his seat on the Board and his wise counsel was regularly available. To succeed to the post of Chief General Manager, the Directors appointed Mr Charles Lilburn, who had worked his way up through all the stages of banking life and had shown great capabilities and energy. Mr John Harris had been appointed a Joint General Manager, and Mr Walter Bentley succeeded to a similar position.

BANK'S ALPROPRIATIONS

Commenting on the Bank's Balance Sheet, he said there had been a substantial fall in Net Profits which were £339,406 lower as compared with the figure shown in 1929 representing a decrease of 15.7 per cent. The poorer results were disclosed in the figure representing Advances to Customers and Other Accounts which showed a shrinkage of no less than £15,000,000. Owing to bad trade money had not been called for in such large volume for current commercial needs.

1 CO'OMIC POSITION

Full was upon a review of this country's staple industries: Coal, Mining, Iron and Steel, Shipping, Shipbuilding, Engineering, Cotton, Wool and Agriculture, the Chairman gave a series of lectures showing the black spots in the distillates of our employment. He said there was no denying the fact that 1940 had been the worst of 10 years, and that at the end of March the 10's were paid for all those

For a number of years our main task has been to help our people to get on their feet. If we are to tell our people to the primary problem of the world it was of great importance to have a concrete example of our policy and to show to the people of the world that we are not only a people of the world but a people of the world.

mainly the legacy of the Great War. He pointed out that nearly a half of our annual budget represented deferred payment for the War and was therefore more or less fixed, the remainder—more than a half—instead of being strictly and rigidly curtailed in view of this fact, has shown a careless tendency to rapid expansion, under successive governments. For years the demand that the country should begin to cut its coat according to its cloth had fallen upon deaf ears, but to-day, when the general and sharp fall in prices had proportionately increased the real burden of taxation the need for national economy must be brought home to the whole people.

THE VITAL PROBLEM

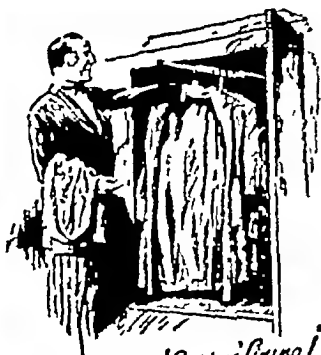
The crux of the whole matter was that British production costs were too high to admit of the possibility of present expansion in trade in competitive markets, whether at home or abroad. Somehow or other we had got to be reduced to a level which facilitated effective competition and this brought him back to one of the gravest features of the situation, namely, the wide and increasing disparity between whole-sale commodity prices and the cost of living. The worker measured the value of his wages against the retail price level - to the manufacturer the standard for judging the burden of war costs as an item in production costs was the *wholesale price level*. Here, too, they found the gap widening. How was it to be narrowed? If they could find the answer to this question they would have struck a blow at the deepest roots of our present trouble.

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NATION & ECONOMY

Page 1 of 1



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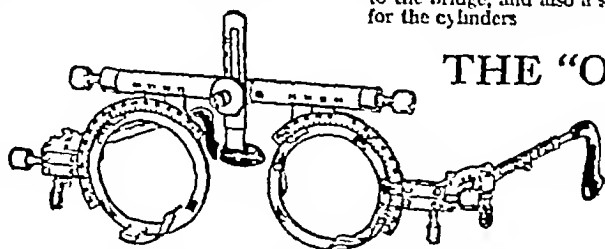


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APPOINTMENTS.

No charge is made for the insertion of these notices the necessary details should be sent before the 14th of each month to The Editor, THE PRACTITIONER, Howard Street, Strand, London, W C 2, to secure inclusion

- ADAMSON, Ethel A., M B, Ch B St.**
And appointed House Surgeon to the
Oxford Eye Hospital
- ALTON, F. O. B. E., M B, B S Lond.,**
M R C S, L R C P, appointed Certifying
Factory Surgeon for the Hollingbourne
District, Kent.
- ANDERSON, James C., M B, Ch B.,**
F R C S Edin., appointed Surgical Reg-
istrar to the Sheffield Royal Hospital
- BRUCE, G. Gordon, M B, Ch B.,**
F R C S, appointed Junior Assistant
Surgeon (attached to the wards of the
Senior Surgeon) to the Royal Infirmary,
Aberdeen
- CHRISTIE, R J E., M B, B Ch.,**
B A O Belf., appointed Certifying
Factory Surgeon for the Earsdon District,
Northumberland
- COOK, Bessie, E., M B.,**
Ch B Lond., appointed Temporary
Honorary Assistant Anaesthetist to the New
Sussex Hospital for Women and Children,
Brighton.
- CUTTING, P E G., M B, B S Lond.,**
appointed House Physician to the West-
minster Hospital
- DANIEL, G M., M B, B S Lond.,** ap-
pointed House Physician to the Westminster
Hospital
- DATE, W. Adlington, M B, B S**
Lond., appointed Honorary Medical
Officer to the Exeter Dispensary
- GAMMIE, R P., M B, Ch B Aberd.,**
appointed Certifying Factory Surgeon for
the Bishop a Stortford District, Herts
- GRAHAM, N. F., M C, M B, B S**
Lond., appointed Certifying Factory
Surgeon for the Tibshelf District,
Derbyshire
- HARDIE, D. M C, M B, Ch B Glas.,**
D O Oxon., appointed Junior Assistant
Surgeon (for duty in Ophthalmic Depart-
ment) to the Royal Infirmary, Aberdeen
- JONES, D W., M R C S, L R C P,** ap-
pointed Medical Referee under the Work-
men's Compensation Act for the County
Court of Pocklington, Selby (Circuit No 15),
and Beverley Bridlington, Goole, Great
Driffield, Howden, Kingston upon Hull
(Circuit No. 16) vice G. B. Nicholson,
M R C S, L R C P, resigned
- JUCKES, F A., M B, C M Ed.,** ap-
pointed Certifying Factory Surgeon for the
Horsham District, Sussex
- LIVINGSTONE, G H M R C S,**
L R C P, appointed House Surgeon to
the Westminster Hospital
- LYELL, Alexander, M D Aberd.,**
M R C P Lond., appointed Clinical
Chemist to the Royal Infirmary, Aberdeen
- McCOULL, G., M B, B S Durh.,**
appointed Certifying Factory Surgeon for
the Wylam District, co Northumberland
- McWHIRTER, J G., M B, Ch B Glas.,**
appointed Certifying Factory Surgeon for the
Whithorn District, co Wigtown
- MURPHY, J P., M B, B Ch, B A O**
(N O I), appointed Certifying Factory Sur-
geon for the Pontebury District, Salop
- NOBLE, T P., M D, F R C S.,** appointed
Professor of Surgery to the University,
Bangkok, Siam.
- RICHARDSON, R P., M R C S,**
L R C P, appointed Certifying Factory
Surgeon for the Bruton District, co
Somerset
- RUSSELL, G B., M B, B Ch.,** appointed
Medical Referee under the Workmen's Com-
pensation Act, 1925 for the districts of
Bishop's Waltham, Petersfield, Portsmouth,
and Newport and Ryde County Courts, vice
F J Wadham, M R C S, L R C P,
resigned
- SCOVELL, J M S., M D, Ch B Edin.,**
appointed Honorary Physician to the London
Skin Hospital, 1 Fitzroy Square, W 1
- SLOT, Gerald, M D, M R C P Lond.,**
D P H, appointed Honorary Physician to
the Royal Hospital, Richmond
- SOMERS, Mary, A E, L M S S A**
Lond., appointed Certifying Factory
Surgeon for the Weston Super Mare
District, Somerset
- SORLEY, J T. M B, Ch B Aberd.,**
appointed House Surgeon to the West-
minster Hospital.
- SUTHERLAND, D P., M B, B S**
Lond., appointed Honorary Lecturer in
Clinical Tuberculosis at Victoria Univer-
sity, Manchester
- SYMONDS, Y. Winifred,**
M R C S, L R C P, appointed Honore
Surgeon (for six months) to the New Sussex
Hospital for Women and Children Brighton.
- THIERENS, Mildred M., M B,**
Ch B Liverp. appointed Asst Medical
Officer of Health for Maternity and Child
Welfare, Bailey
- TIBBLES, Sidney, L R C P and S,**
L R F P S., appointed Honorary Ocellist
to the London Orchestral Association, the
Musicians Union, also to the Sisters of the
Church, and the Orphanage, Kilburn.
- WALKER R R M D** appointed Med-
ical Referee under the Workmen's Com-
pensation Act 1925 for the districts of the
County Courts of Kingston (Circuit 22),
Bulth, Knighton Llandrindod Wells Pres-
teign (Circuit 28), vice H A Debenham
M R C S, L R C P, resigned

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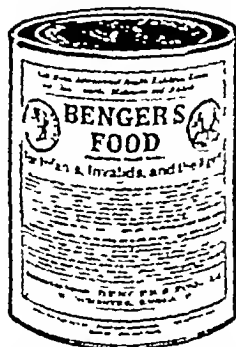
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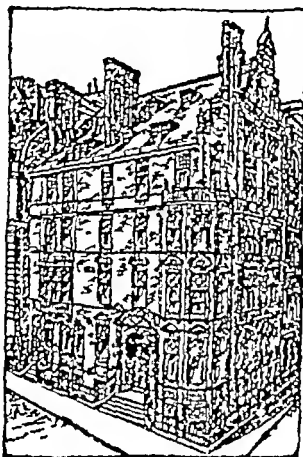
NOTICES.

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Communications relating to the Editorial Department must not be addressed to any individual member of the Profession on the staff, but to The Editor 'THE PRACTITIONER,' Howard Street, Strand, London, W C 2

Original articles, clinical lectures, medical society addresses and interesting "cases" are invited, but are only accepted upon the distinct understanding that they are published exclusively in "THE PRACTITIONER." Unaccepted MS will not be returned unless accompanied by a suitable stamped addressed envelope



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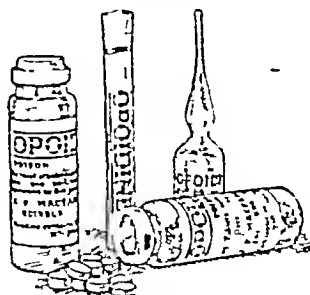
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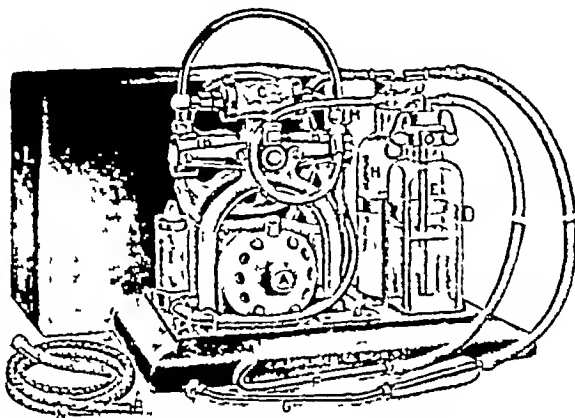
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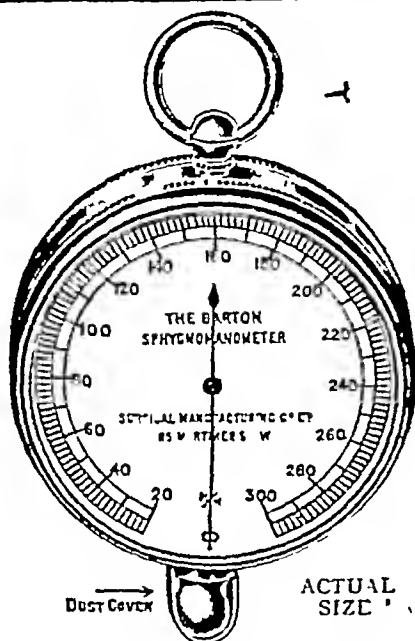
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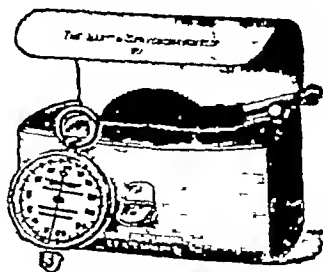
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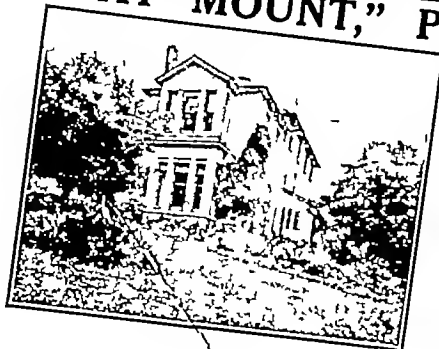
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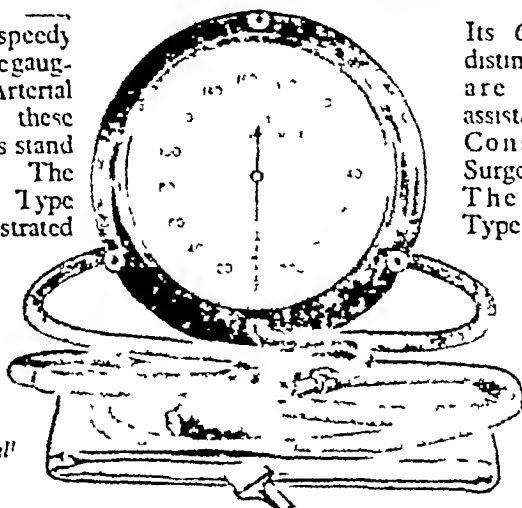
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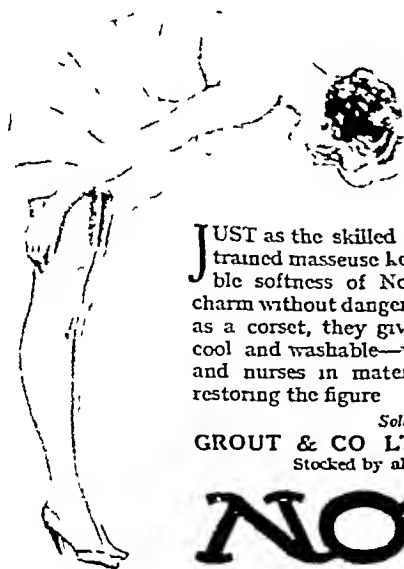
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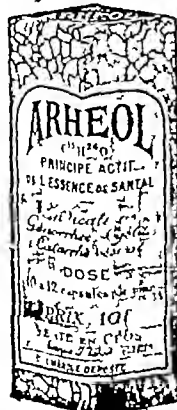
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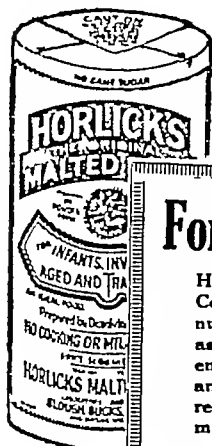
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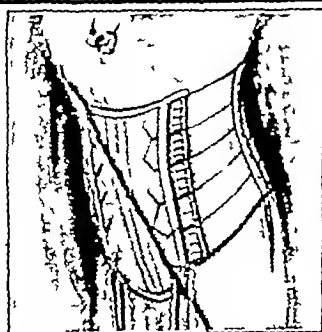
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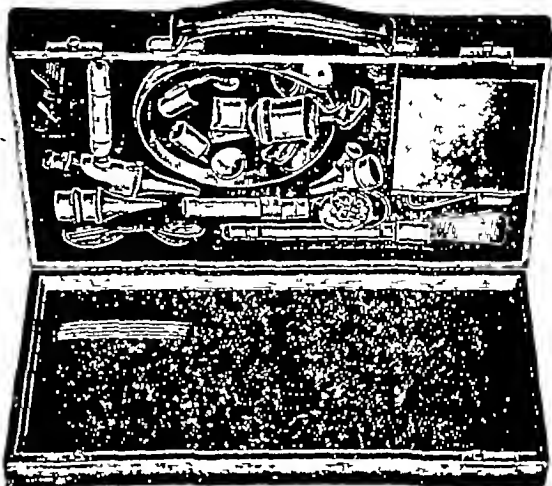
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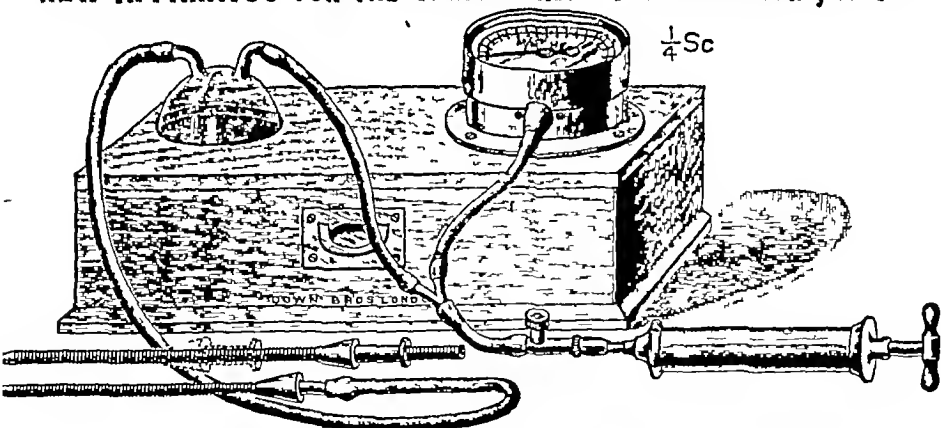
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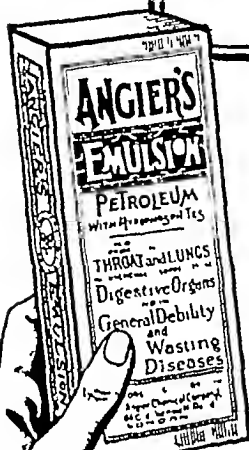
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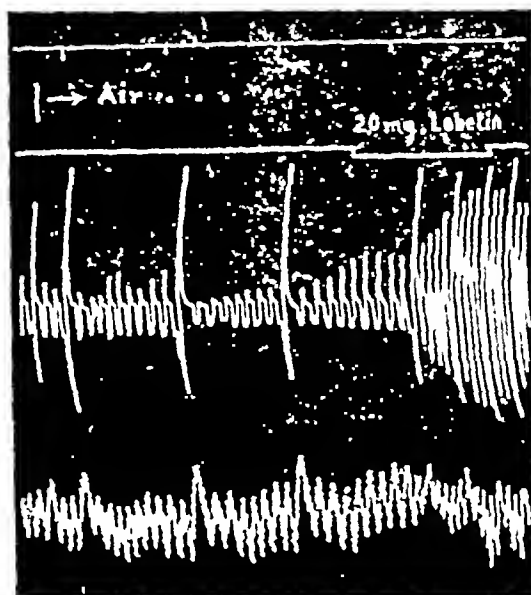
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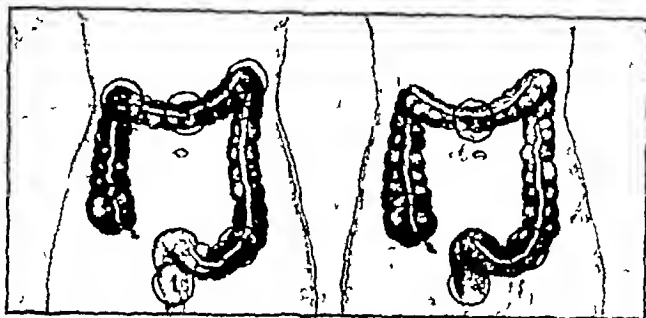
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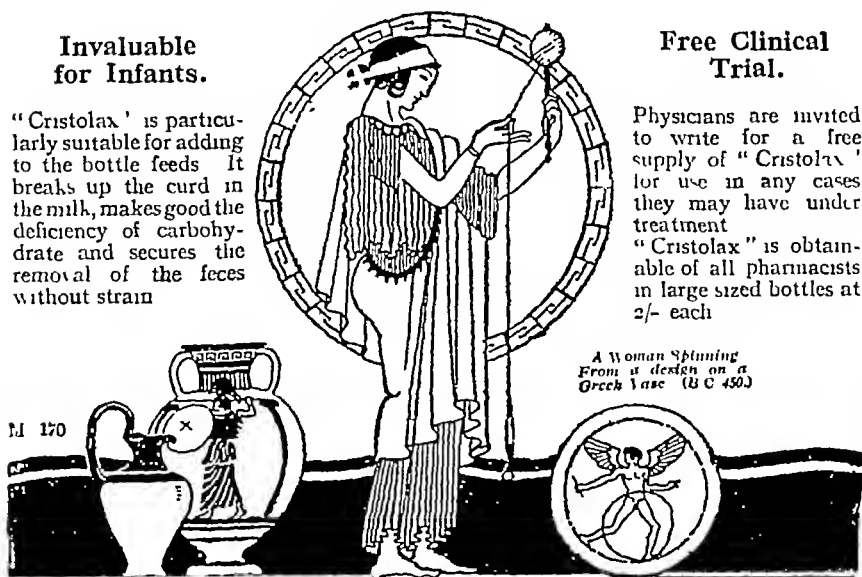
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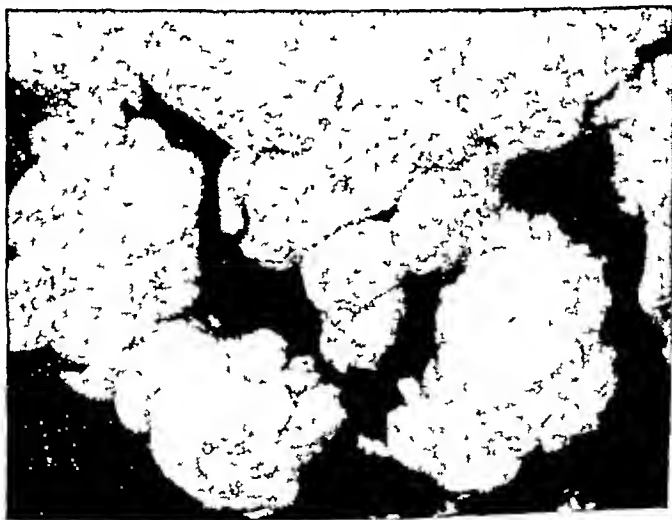
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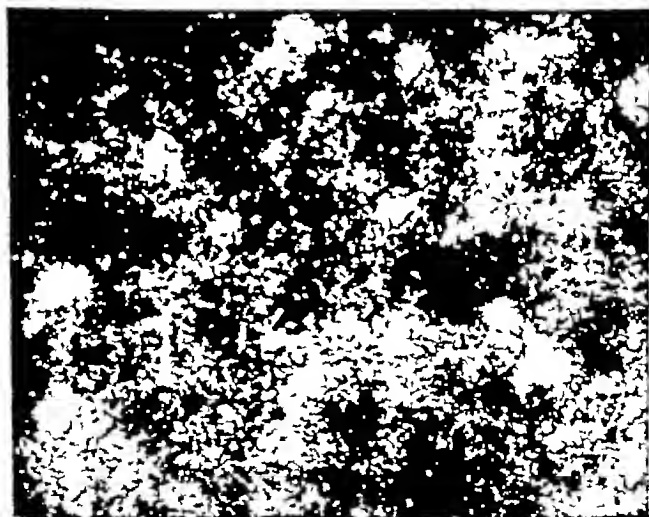
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THE PRACTITIONER

JANUARY

1926

Introduction.

BY SIR HUMPHRY ROLLESTON, BART, K.C.B., M.D

Physician in Ordinary to His Majesty the King, Regius Professor of Physic in the University of Cambridge, President of the Royal College of Physicians

AMONG the advances which have taken place during the past ten or fifteen years in the science and art of medicine, some of the most striking have been in the methods adopted for the diagnosis of disease. Methods not long ago introduced in a tentative manner for employment in specialized investigations have to-day become ordinary matters of routine eminently applicable in general practice

The main purpose of these two Special Numbers of THE PRACTITIONER is to familiarize the general practitioner with some of the more important of modern diagnostic methods, and to demonstrate their value in everyday practice, emphasizing the general principles



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Fig 4.—Two shadows just below the neck of the last rib on the right side. The situation of these opacities makes it very unlikely that they are due to renal calculi. (See next figure)



Fig 3A.—A ureteric catheter has been passed up to the pelvis of the left kidney, and shows that the shadow in question in the previous figure is without doubt a stone in the renal pelvis. Owing to the very distended condition of the kidney, the renal pelvis lay considerably in front of the plane of the anterior surfaces of the vertebrae



INTRODUCTION

in these two Special Numbers will give many other examples of the help that laboratory methods give in clinical diagnosis and treatment.

There is, perhaps, a certain danger, especially for the recently qualified practitioner, in relying too greatly upon the elaborate equipment possessed by every modern teaching hospital, and amid the difficulties that beset a busy practice he may feel somewhat at a loss without the adjacent bacteriological and biochemical laboratories, and all the familiar armamentarium of the hospital. This, we are told, is one of the problems particularly confronting medical practice in America, where the wide spaces of the less inhabited areas so greatly isolate the country doctor from his familiar and, indeed, necessary aids, that in some districts there has been no permanent newcomer to the local medical profession for fifteen or twenty years.

Important and necessary, however, as modern histological, hæmatological, bacteriological, and chemical examinations undoubtedly are in medicine, we must not over-estimate them or imagine that they make the older clinical methods of examination superfluous. Laboratory investigation must go hand in hand with the ordinary direct clinical examination of the patient, and the functions of the clinical laboratory should be looked upon as accessory ones, even although the laboratory data may have in many cases a more definite value than the physical signs in arriving at a successful solution of the clinical problem.

Careful history-taking and a thorough physical examination, with the exhibition of a due proportion of clinical acumen and common sense, will, on the whole, serve the practitioner better than much laboratory lore. But the ideal is a critical judgment founded on the combined information supplied by the two methods, each serving as a supplement and check to the other.

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which should guide the practitioner rather than the details of technique. Owing to postal difficulties, it has been found impossible to include in one number the wide survey of modern methods in diagnosis which the distinguished contributors have presented, and the material has had to be divided into two parts. The February issue will therefore be a continuation of the present one.

Laboratory methods, which make up clinical pathology, supplement the diagnosis made by ordinary bedside examination in several directions, just as the microscope or the telescope increases the ordinary man's powers of observation. Physical signs, though they do not provide all the information to be derived from ordinary clinical examination, deal mainly with the evidence produced by gross structural change, whereas laboratory methods not only may reveal structural changes, such as those in the blood, urine, cerebro-spinal fluid, and gastric secretions, which at best can only be guessed at by the unaided eye, but they may reveal the disorders of function which precede organic change.

Again, laboratory methods, for example, those based on bacteriology and serology, render diagnosis more minutely accurate; thus, what is clinically a case of fever of uncertain origin, probably enteric fever, may be definitely settled by the Widal test to be typhoid fever (due to infection with *Bacillus typhosus*) or paratyphoid A or paratyphoid B fever. Success in specific treatment turns on accurate diagnosis; for example, the laboratory determination of which strain of the infecting micro-organism is present in a case of meningococcal or pneumococcal infection may be of great importance in directing the serological or specific treatment. By the Schick and the Dick tests those susceptible to can be distinguished from those immune to diphtheria and scarlet fever respectively, and as to be artificially protected. The articles

THE PRACTITIONER

is much more pardonable. In the severe cases the initial symptoms will be a sudden rise of temperature to 103° or 104° Fah., often a rigor, intense toxæmia, vomiting, headache, and even delirium. In the milder cases the temperature may, at first, only be raised a degree, the constitutional symptoms may be scarcely noticeable, and in the case of the lower limb, the patient may be able to walk a short distance without much complaint of pain. It is in these cases that a diagnosis of osteomyelitis presents extreme difficulty. Let me mention two typical examples of the disease:

CASE 1—A little girl of 10 years of age, seen with Dr A. A. Greenwood. The history given me was that the child had a rigor about mid-day and complained of intense pain in the lower end of the tibia. I saw her at 10 p.m., the temperature was then 104° , the pulse rate 138, and the child was evidently extremely ill. The slightest movement of the limb was painful, and pressing on the lower end of the tibia produced intense agony. Two openings were made by a small trephine into the medullary cavity of the lower end of the tibia and the blood that exuded swarmed with the staphylococcus aureus. Recovery was rapid and no necrosis followed. It will be seen that, owing to Dr Greenwood's sound judgment, the bone was opened ten hours after the first symptoms of the disease.

CASE 2—In marked contrast stands the following case. A boy, 13 years of age, was brought to me by an experienced practitioner. He had received a kick on the head of the tibia some days previously. He complained of some pain two days prior to consulting me, but had gone to the pantomime the previous evening and had slept fairly well during the night. When I saw him with his doctor, his temperature was 99.8° , his pulse rate 88, and he had slight tenderness on deep pressure over the upper end of the tibia, but he had walked from his house to the omnibus, and from the omnibus to my house, more than three-quarters of a mile in all, without complaint. I confess that I failed to diagnose osteomyelitis and that my failure to do so was a grievous one for the boy. Four days later I was called to operate upon him. He had then a subperiosteal abscess with pus in the medulla. Five days after the operation he had osteomyelitis of the lower end of the femur of the opposite side and a week later osteomyelitis of the left parietal bone. Sequestra separated from all his bone lesions and prolonged suppuration endangered his life for many months. The causal agent in this instance was the staphylococcus albus, and, as is so frequently noticed in such cases, it seemed to gain in virulence as time went on.

Two common errors regarding acute osteomyelitis deserve mention. It is generally considered that acute

THE PRACTITIONER

osteomyelitis in an adult is always of the relapsing variety, i.e. that it is a recrudescence of the disease starting in childhood. This is quite incorrect. Not long ago I saw, in one week, two instances of primary acute osteomyelitis in adults :

(1) With Dr Jubb, involving the whole of the shaft of the humerus, in a lady of thirty years, resulting from a boil, (2) with Dr Blucke, involving the shaft of the femur, in a man aged fifty years (in this instance the pneumococcus was the causal agent)

In cases originating in adult age it is noteworthy that the disease more frequently starts about the middle of the shaft of a long bone, and not, as in children, at one end of the diaphysis. These cases in adults are almost invariably missed in diagnosis until pus reaches the periosteum

The second common error regarding the disease is that it only occurs in the long bones. No bone in the body is exempt. I have not infrequently found it in the ilium, the scapula, the flat bones of the skull, the sternum, and the os calcis. In one interesting case, seen with Dr. Cockburn, osteomyelitis of the eleventh rib of the right side, by irritating the eleventh intercostal nerve, produced a lump of contracted muscle which closely simulated an abscess due to appendicitis. I have frequently noticed acute osteomyelitis follow a boil, an infection of the fingers, tonsillitis and pharyngitis, but it is an extraordinary fact that osteomyelitis almost always occurs, not during the acute stage of the predisposing condition, but after it has subsided and is nearly forgotten. Thus, in three instances in which acute osteomyelitis followed a boil an interval of about three weeks elapsed between the boil and its serious sequence.

An important point to bear in mind is that in osteomyelitis the inflammation arising in the marrow—i.e. being deeply situated in the bone—frequently presents no signs of its presence except tenderness on *deep*

pressure. I am certain that the real reason for the condition being so frequently missed in its early stages, is that the practitioner expects to find the cardinal signs of inflammation present, viz. heat, redness, swelling, and pain. In the early, i.e. the easily curable, stage of osteomyelitis there is no local heat, no redness, and no swelling. Pain will be present, but varies in intensity in different instances, and may, in cases not due to the *Staphylococcus aureus*, be almost negligible. I venture to stress this absence of the ordinary signs of inflammation because I have so frequently heard practitioners say: "How could I have diagnosed acute osteomyelitis when there was no local heat, no redness of the skin, no swelling, and but little pain." Here you have the explanation of the failure to institute timely surgical intervention.

Of course, the signs of inflammation will be present when the pus has exuded through the bone and has invaded the soft parts, but by this time necrosis will have occurred, and surgical aid will have been summoned too late. It is always a source of wonder to me how osteomyelitis is so frequently mistaken for acute rheumatism of the neighbouring joint. There is no effusion into the joint (early in osteomyelitis), there is no superficial tenderness over the articulation as in inflammation of the joint, and the tenderness is either above or below the joint, not in the joint itself. The diagnosis should always be made within 24 to 36 hours, if necrosis is to be prevented. Of course, the microbes are always brought to the bone by the blood stream, but more often than not the atrium of infection is not discovered.

If I am asked on what grounds the diagnosis of acute osteomyelitis is generally made, I would say a sudden rise of temperature, possibly a rigor, a feeling of malaise, a pain, which at first need not be severe, in a long bone just above or below a joint and, far more important,

THE PRACTITIONER

marked tenderness on firm, deep, and prolonged pressure over the site of the pain.

These are all the signs that one usually meets with and they must suffice. It is dangerous to wait for further confirmation of the diagnosis. Given such signs it is the bounden duty of the medical attendant to have one or more openings made into the bone right down into the medullary cavity to relieve the tension and to save necrosis. Delay means rapid extension of the inflammation, necrosis, and dire danger. Early relief to the tension ensures speedy recovery with undamaged limb. I would say "don't wait for a surgeon," but, *faute de mieux*, take a gimlet or drill from a carpenter's tool-chest and, after boiling it, drill two or three holes into the bone yourself. It cannot too clearly be stated that, if pus be present and ooze slowly through the drill-holes, the operation has been performed too late. Do not expect pus to rush out when you open the bone. In the soft parts pus can gush out when an abscess is opened, because the walls of the abscess collapse. This, of course, cannot occur in the case of a bone.

It should be remembered that, in a case of osteomyelitis, the bone ought to be drilled before pus has had time to form, and when only blood, swarming with staphylococci, or other microbes, oozes out. We ought always to attain this desideratum in the case of a long bone in a child, but I fear that all of us will be liable to error when we encounter a case in a flat bone, or in a small bone, in which cases it is less easy to think of osteomyelitis, and the same applies, even in a long bone, to a primary acute osteomyelitis originating in adults.

Sub-phrenic Abscess.—This dangerous condition, a collection of pus beneath the vault of the diaphragm, is generally missed in diagnosis, because it is never thought of. It is true that, owing to the realization of

PITFALLS IN DIAGNOSIS

the need for immediate operative treatment of appendicitis, and of other abdominal emergencies, sub-phrenic abscess is becoming less frequent, but it still takes a large toll of human life, and is far too often overlooked in diagnosis. I have found it a useful rule to follow that when, any time from two weeks to two months after a septic lesion in the abdominal cavity, a patient who has appeared to be well on the road to recovery develops continuous fever, elevation of pulse-rate and malaise, and no definite cause can be found for the rapid deterioration in health, the possibility of a sub-phrenic abscess should be seriously considered. Applying this rule I have, not infrequently, when discussing a case over the telephone with the medical attendant, said: "Surely this is a sub-phrenic abscess; I will come down prepared to operate," and in the majority of instances my provisional diagnosis has proved correct. In almost every case the practitioner has said: "I never thought of sub-phrenic abscess."

It is generally said that appendicitis causes one-sixth of all sub-phrenic abscesses. In my experience this is far too low a proportion, as more than half of my cases have owed their origin to lesions of the appendix vermiformis. Probably next in order of frequency among the causes comes perforation of an ulcer on the posterior wall of the stomach into the lesser peritoneal sac. In this case the abscess is almost always situated under the left half of the diaphragm in contradistinction to those caused by appendicitis, which are practically invariably on the right side. Let me relate a typical case:

A young farmer, 24 years of age, was operated upon by his medical attendant in a cottage hospital for an abscess due to appendicitis, on the seventh day of his illness. Several ounces of stinking pus were evacuated and a drainage tube was inserted. No attempt was made to remove the appendix. All went well for twenty days and the patient was then told he could go home the

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next day That evening he complained of malaise and the temperature rose, in four days, to 103° , and the pulse rate to 120 He complained of shivering, but had no definite rigor This state of matters continued for a further five days, the patient emaciating, being bathed in sweat and obviously going downhill rapidly At this stage I saw the case The liver dullness was markedly increased It reached both higher up and lower down than normal An X-ray screen examination showed the dome of the right half of the diaphragm much more elevated than normal and bulging upwards, as if it had been pushed up by a fist in one place instead of having its usual upward curvature The abscess was drained and the temperature and pulse fell to normal

This was a simple case to diagnose, but I must admit that the diagnosis of sub-phrenic abscess is often a matter of great difficulty. I would draw attention to the fact that percussion over the abscess is frequently most misleading. If the abscess is overlain with normal lung, percussion will give the normal note. If there be a basal pleural effusion the note will be dull. If the abscess contain gas, as it frequently does, owing to the presence of the *Bacillus coli*, a tympanitic note will be elicited. The abscess may—I am speaking now, of course, of right-sided cases—be above, behind, or in front of the mass of the liver. Further, it may be fairly superficial or deeply-seated. Clearly the presence of a pleural effusion increases the difficulty of diagnosis. More often than not no effusion is present, and the breath sounds, at the base of the lung, are normal In doubtful cases the absence of any abnormal lung sounds is in favour of the diagnosis of sub-phrenic abscess. Where possible an X-ray examination should always be made use of, as the information a radiogram may afford is often of the greatest value.

In a sub-phrenic abscess, situated immediately above the liver, a marked, localized, upward convexity of the diaphragm will always be observed in the radiogram, whereas, in a basal pleural effusion, especially when purulent, the normal convexity of the right dome of the diaphragm will be diminished,

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and may disappear completely, so that the diaphragm becomes horizontal

An important diagnostic point is that an effusion into the pleural sac caused by pleurisy, pneumonia, and empyema, or pulmonary infarct, starts with dramatic suddenness, with pain in the chest, and real difficulty in breathing, whilst a sub-phrenic abscess takes days to develop, and is painless, certainly at the commencement. Should a pleural effusion be present it should always, in cases of doubt, be examined bacteriologically. If it be found sterile the probability is that it is secondary to a sub-phrenic abscess. Should the abscess contain gas the percussion note, in the absence of any effusion or consolidation of the base of the lung, is quite diagnostic. If a pleural effusion co-exist with a sub-phrenic abscess the diagnosis may be a matter of grave difficulty because, on the right side, the dullness of the liver passes insensibly into that of the effusion in the pleural sac. In a good radiogram a serous effusion may be seen to be much less opaque than the liver mass, but, with an empyema, no difference between the opacities may be distinguishable.

Frequently a definite diagnosis of sub-phrenic abscess can only be made by puncture with a needle of an aspirator; but this may only be done when everything is prepared for the drainage of the abscess if, and when, found. We must never aspirate a sub-phrenic abscess and leave the track of the needle free to drain into the pleural sac or the peritoneal cavity. I have known death thus caused more than once. Further, let me mention that, on three occasions, I have incised and drained a right-sided basal empyema, and then, some days later, as no improvement was manifested, I have operated a second time and found a sub-phrenic abscess. Frequently it is a matter of extreme difficulty to locate a sub-phrenic abscess. In a recent case I operated upon pus was encountered only on the sixth

insertion of the exploring needle

Right-sided sub-phrenic abscesses have comprised the large majority of my cases. Left-sided sub-phrenic abscesses, however, I have found easier to diagnose, because all of my cases have been due to leakage from a gastric perforation into the lesser peritoneal sac. The practitioner must bear in mind the possibility, I would almost say the probability, of a sub-phrenic abscess in cases in which, any time between two weeks and two months after any septic abdominal condition, the patient, who has hitherto appeared to be making good progress towards recovery, develops a continuous high temperature, a constant quickening of the pulse-rate, and a rapid deterioration of health, for which no obvious cause can be discovered. The mortality of sub-phrenic abscess is high because the condition is so frequently missed in diagnosis. It goes without saying that the sooner the diagnosis is made, and the abscess drained, the better the chances of recovery. There are few more life-saving operations than a timely one for sub-phrenic abscess, and I am convinced that the mortality of the condition is so high because it is so frequently never even thought of at all. The mortality of sub-phrenic abscess would be halved if every practitioner kept the possibility of its existence constantly in mind.

The Period of Reaction after Perforation of a Gastric Ulcer.—I now wish to direct attention to something I consider a real danger in diagnosis, namely, what is termed the “period of reaction after perforation of a gastric ulcer.” I may best illustrate my meaning by referring to two striking cases :

CASE 1 —A gentleman, aged 30, consulted the late Sir James Galloway, who diagnosed a gastric ulcer and wished him to enter a nursing home, to be kept under observation and to have a skiagram taken. He left Sir James’s house, had a milk and bun lunch, and then went to the Western District Post Office to send a telegram to his

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parents. Whilst writing the telegram he fell unconscious from the agony of a gastric perforation. The officials searched him, and finding an appointment card, telephoned Sir James. This was at 2 p.m. I saw the patient at 6 p.m. His temperature and pulse were normal and he was sitting in an armchair saying he felt quite well and wanted to go home. Examination of his abdomen revealed nothing beyond slight rigidity of the abdominal wall over McBurney's point. It was only with the utmost difficulty that Sir James and I persuaded him to allow operative treatment to be carried out. A large perforation of the anterior wall of the stomach was found, and the stomach contents had been directed, by the mesentery, to the right iliac fossa.

CASE 2.—In the second case, seen with Dr. Gurney Thompson, of Tottenham, a newspaper sub-editor, aged 32, perforated an ulcer of the anterior wall of the stomach at 9 a.m. I saw him at 3 p.m. He was then, he said, quite well and must get away to the office immediately after I left. Pulse and temperature were both normal and nothing amiss could be discovered beyond the fact that his respirations were 32 per minute. The patient's account of his collapse and overwhelming pain at the onset of his attack, and Dr. Gurney Thompson's description of the condition in which he found him half an hour later, were unmistakable, and I advised that he be taken to hospital for immediate operation. On my arrival at hospital at 5 p.m., my house surgeon met me with a smile, and said "Your perforated gastric ulcer man has just walked upstairs and says he feels very fit." In spite of the patient's energetic protest that he was being submitted to an unnecessary operation, his abdomen was opened, the perforation found, and three pints of fluid removed from his peritoneal cavity.

Both the patients made good recoveries, but, had not the history in each case been abundantly clear, I confess I should not have believed it possible that they could have been suffering from such a grave condition, and could not have blamed anyone who had said that they had nothing the matter with them.

These two cases surely teach us that, in some instances of perforation of a gastric ulcer, a wonderful temporary improvement in the symptoms may occur before the graver signs of peritonitis develop, and that this temporary improvement may be very misleading. I admit that such an absence of symptoms as illustrated in the two cases above is unusual, but I cite them as a warning because in no abdominal condition is immediate operation of more vital importance. I

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think it would be safe to say that of cases of acute perforation of a gastric ulcer, operated upon within twelve hours of perforation, 90 per cent recover, whereas of those operated upon after forty-eight hours 90 per cent die.

It sometimes happens that the surgeon, called to an abdominal case, can get no further in diagnosis than that of a very probable perforation of a gastric ulcer. In such a case I would urge immediate operative treatment because my experience has been that, in every instance, the lesion present has been either a perforated gastric ulcer or some condition equally calling for operative treatment. I should mention that in perforation of a duodenal ulcer the period of reaction, to which I have drawn your attention, after a gastric perforation rarely, if ever, shows anything like the same marked temporary amelioration of symptoms that is often noticed after gastric perforations

Gangrene of Appendix.—I am almost afraid to say a word about appendicitis after the deluge of communications we have had during the past few years. There is, however, one matter to which I wish to refer, namely, the sudden cessation of all symptoms and the extraordinary temporary improvement that may follow gangrene of the appendix. To illustrate my meaning let me mention a typical case.

I was called to a county town to see a medical practitioner who, for two days, had been suffering from appendicitis. I was informed that his temperature was 102° 6', and his pulse rate 116. I was met at the station by his partner and by a physician who told me they were sorry that they had troubled me unnecessarily, as the patient, an hour before my arrival, had suddenly felt quite well, that his pulse and temperature were now practically normal, that he was free from pain, and that he utterly declined to have any operative treatment. To the amazement of the two doctors, I said "That is an urgent call for an immediate removal of the appendix." Never have I had so great a difficulty in persuading a patient and his medical advisers to consent to operation. They all thought that the noxious material inside the appendix had found its way back into the cæcum (a thing, by the way, I have never known to occur). I

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had to insist that a sudden gangrene of the appendix had occurred, and that the patient's life would be in urgent danger were the gangrenous viscous allowed to remain *in situ*. Operation revealed an appendix which was like a piece of chamois leather and which lay, free from adhesions, in the peritoneal cavity.

I have met with many similar cases. My knowledge of this sudden and wonderful cessation of all symptoms in gangrene of the appendix I owe to a—to me—most instructive talk I was privileged to have with that great surgical teacher, the late J. B. Murphy, of Chicago, and I have no doubt that his explanation is the correct one. Murphy, in his terse, vigorous way, said: “(1) The dead appendix ceases to absorb its noxious contents, and, therefore, pulse and temperature fall to normal. (2) The nerves of the appendix are dead and, therefore, pain ceases. (3) Adhesions can only be formed between two living surfaces. The appendix being a dead thing, no adhesions will be formed to it and, therefore, there is the awful danger of diffuse septic peritonitis when the microbes pass through the gangrenous walls of the appendix, or it drops off.” Murphy finished thus. “I guess, sir, you can find no fault with that reasoning?” And I guessed that I could not.

Inversion of the Testis—This is a subject hardly ever mentioned in the surgical text-books, and I shall not be surprised if the majority of practitioners have never even heard of it. Yet it has, I am convinced, a considerable importance. In this condition the testicle is displaced, so that the epididymis is in front, and the body of the testicle behind it. The tunica vaginalis lies posterior to the body of the testis, and a hydrocele will, therefore, have the testis in front of it.

As regards the frequency of inversion, I may mention that I examined 100 adult men and found it present in three instances. My colleague, Dr. Alfred Piney, director of the Institute of Pathology at Charing Cross Hospital, was kind enough, at

my request, to pursue an extended inquiry into the question, and he informs me that in 907 *post-mortem* examinations he has found inversion of the testis twelve times. In no case was the inversion bi-lateral. Under ordinary conditions this displacement is never discovered. Serious danger threatens, however, when a hydrocele is tapped or operated upon in the case of inversion of the testis.

A young medical practitioner, who had just bought a country practice, had, as one of his first patients, the Squire, who had a large hydrocele. Three times my friend plunged the trocar into the front of what he took to be a hydrocele but nothing but blood escaped, and on the third occasion the patient fainted. Hæmatocele quickly resulted, and later suppuration of the testicle. I had to perform castration. My young friend remarked "I cannot blame myself for not recognizing a condition not mentioned in one of my surgical books."

I confess that I am surprised that Dr. Piney's statistics show that inversion of the testis occurs only in about one man in seventy-five. In my experience injury to the testis in tapping a hydrocele has been a frequent cause of hæmatocele of the tunica vaginalis testis, and in only one of these cases had the testis not been inverted. When the general practitioner has to tap a hydrocele which is not translucent to transmitted light, my advice is to enter the trocar on the outer side of the scrotum, instead of in front. I think it probable that inversion of the testis may predispose to the development of a hydrocele, because I have met with the condition in no fewer than twenty-two patients.

The Value of Modern Laboratory Methods to the General Practitioner.

By SIR FREDERICK W ANDREWES, M.D., F.R.C.P., F.R.S.
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of London, late Assistant Physician, Royal Free Hospital, etc*

THE past five and twenty years have witnessed a new development in medicine and surgery. Within the memory of many now living and practising, these subjects were purely clinical; the data required for diagnosis and treatment were derived solely from the trained senses of the observer, aided by a few simple clinical instruments; there was perhaps an occasional appeal to the microscope, and simple chemical tests of the urine were carried out in the ward. The basis of successful practice still depends and must always depend upon thorough physical examination of the patient, but the progress of modern pathology has revealed a host of changes in the diseased body which can be detected only by laboratory methods requiring a special training.

Investigations of this sort can be employed to supplement and reinforce the data gained from purely clinical observation, and thus has arisen a new branch of study—clinical pathology—which is growing yearly in its scope. It has proved of such value that every large hospital has long been compelled to possess and equip clinical laboratories manned by trained workers in histology, hæmatology, bacteriology, and bio-chemistry.

The student, during his curriculum, is obliged to gain some practical acquaintance with the methods

of clinical pathology, and their utility in practice is daily brought home to him at the bedside. It is not too much to say that were a modern clinician suddenly to be deprived of these new aids to his work, he would feel almost as if he had lost one of his special senses.

Now this deprivation is one of the things that is in danger of happening to the qualified man when he embarks on general practice, and the aim of the present article is to consider the nature of this difficulty, and how it can be met. There are doubtless many of the older school, who received their training in the days before clinical pathology was thought of, who get along without it, trusting, as they were taught to do, in their own clinical acumen and common sense. But the man of modern training, who has realized during his hospital career how much help pathological methods can afford in suitable cases, feels the want of them acutely in many a doubtful or difficult case. The data derived from them have, in fact, become indispensable to the modern general practitioner, if he is to do his best by his patients.

There are some few men with a natural inclination for laboratory work who become, up to a point, their own clinical pathologists. Anyone with the necessary apparatus can stain sputa for the tubercle bacillus, or do blood-counts in his own consulting room. Such a practice is rare, partly because a man who is not regularly performing such tests comes to distrust his own powers, but chiefly because the pressure of a busy practice allows little time for investigations of the kind. The practitioner must therefore fall back upon the professional pathologist.

Should his practice be in a large town and should the patient be in a position to afford the necessary fee, no difficulty arises. A pathologist can be called in as readily as any other consultant, and the position is

analogous to that at a large hospital, where it is common for the pathologist to discuss a case with the clinician at the bedside. Emphasis must be laid, as every clinician will be ready to admit, on the value of this consultative element, in which the clinician can put his difficulties before the pathologist at first-hand, while the pathologist can see the case and ask any questions he chooses. Both parties, not to mention the patient, gain by such a procedure.

Nevertheless, in the majority of general practices such ideal conditions cannot be realized. Clinical pathology has to be carried out through the post, often by the aid of one or another of the clinical research institutions which have grown up in response to this particular need. A procedure of this nature requires careful consideration since it is that adopted by the majority of general practitioners.

There can be no doubt that many pathological examinations, and these the most frequently required, such as the staining of sputa, the examination of throat swabs for the diphtheria bacillus, and the Wassermann reaction, can be carried out quite well through the post provided that the practitioner is capable of furnishing suitable material.

To this matter reference will be made later. There are, however, other investigations, such as the more elaborate blood examinations, in which postal transmission is unsatisfactory and really reliable results difficult to attain. Here, if the pathologist cannot be brought to the patient, the patient must be taken to the pathologist. It is necessary for the practitioner to understand the limitations of "pathology by post."

The practice is not without its dangers in other respects, and of these the greatest is that it tends to lose what has been mentioned above as its "consultative" character—the ideal which the practitioner should always have in mind. There is, to put it bluntly, the

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danger that it may degenerate into a "penny-in-the-slot" affair, in which the practitioner pays a small fee, and expects his diagnosis by return of post. For such a degradation of clinical pathology, should it occur, both parties must take some of the blame.

It is a common practice for the pathologist to relegate the technical part of the examinations he is asked to make to a trained laboratory attendant. This is reasonable enough, for experience renders such assistants very competent at laboratory technique, but it is to be feared that in some instances the share of the pathologist in the examination consists in little more than signing the report and receiving the fee. In such circumstances the transaction has become a purely commercial affair: the report may be a correct one, and may serve its purpose in many cases, but it has lost the element of personal consultation.

The practitioner, on his side, may justly argue that diagnosis is his province alone: he needs to know a certain fact and he pays for it. Why should he furnish full details of the case and explain his difficulties to someone who, for all he knows, may be an unqualified laboratory assistant? He often fails to realize that, to a conscientious pathologist, lack of full details may be a serious handicap in the interpretation of the findings. Thus he may not get from the examination all the help it might have been capable of affording. It should be obvious that the more he can succeed in interesting the pathologist in his case the more value is he likely to get out of him.

Certain conditions may be laid down which underlie the value of modern laboratory methods to the general practitioner who cannot himself carry them out. They may apply little to the simpler examinations which are often required, but they increase in importance with the elaborateness of the examination.

The first is that the practitioner should have been

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so trained as to appreciate the help that clinical pathology can give. Under the conditions now existing at large hospitals and at most small ones, the student can hardly fail to gain a correct impression on the matter, and this without necessarily acquiring more than a general acquaintance with laboratory technique. He should have been taught how to collect and transmit through the post the material required for pathological examination.

He should know how to obtain a proper sample of sputum, free from buccal secretions, he should be able to take a faucial or pharyngeal swabbing, to take a syringe-ful of blood from a vein, and to do a lumbar puncture, he should know in what fixing solution a portion of tumour should be placed on removal from the body.

Every clinical pathologist knows only too well how often material arrives by post in so lamentable a condition as to be almost useless, simply because the general practitioner has been ignorant or careless as to such essential matters

The second condition is that he should know, and trust, a pathologist (or an institution) whom he can take into his confidence. He should set forth a brief statement of the case and of the problem in which he requires help, with details of the nature of the material sent, and how and when it was obtained.

In this way he may be assured of obtaining all the help which the pathologist can give at a distance, and he may furthermore often get a hint as to any other form of examination which may perhaps throw light on a difficult case. It will be the nearest approach to a true consultation which can be obtained through the post. He will not, it is true, be as well off as the hospital clinician with a laboratory on the spot, for there will remain those examinations which cannot be done through the post, but he will be able, in the great

majority of the cases in which he wants pathological assistance, to get his requirements fulfilled. The value to him of what he thus obtains must depend on his own training and intelligence.

One thing remains to be said in conclusion. So valuable have modern laboratory methods proved, that the clinician, and perhaps especially the general practitioner, may be tempted to place too much reliance upon the pathologist. Clinical pathology by post is one thing, diagnosis and treatment by post are quite another. It cannot too strongly be insisted that the results of laboratory methods, often carried out without actual contact with the patient, must be kept in due perspective as factors only, though often very essential ones, in the full review of the facts concerning any particular case. They can never replace, for example, the thorough physical examination of the patient of which the principles have been handed down to us by precept and example as the result of long clinical experience. Had space permitted, it would have been interesting to quote illustrations of the errors which have arisen in practice from neglect of this elementary fact. It has, however, been necessary in this article to deal with general principles and not with details. The observations which have been made are perhaps evident truisms: none the less they may serve some useful purpose, if only from the fact that they are so often neglected or forgotten.

Value of Examination of the Eye in Diagnosis.

By SIR RICHARD CRUISE, K.C.V.O., F.R.C.S.

Surgeon-Oculist to His Majesty the King, Surgeon, Royal Westminster Ophthalmic Hospital, etc.

WHEN the Controlling Editor invited me to contribute an article to this Special Number of THE PRACTITIONER, he stipulated that "only the general principles which should guide the man in practice are to be dealt with." It will be understood, then, that this is an article to try to assist the man in practice during his general examination of the patient, to obtain special information from the eye, and not for the man who, by a special examination of the eye, obtains general information about the patient.

The diagnostic value of examination of the eye lies in its potentiality for confirming a suspicion, or for arousing a suspicion, and in one class of case—hypophyseal tumour—in being the sole arbiter for conviction or acquittal of a suspect.

I will presuppose the possession of two instruments only, the binocular loupe and the electric ophthalmoscope.

The most convenient subdivision will be into the following: (1) External examination and subjective testing, with deductions; (2) internal examination, with deductions.

1. EXTERNAL EXAMINATION.

Observation is the most important external examination

Lids.

Edema will suggest renal disease, if not due to local conditions.

Ptosis, when not congenital, tr

or trau-

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matic, suggests third nerve paralysis of syphilitic or cerebral origin; it is also a distinctive feature in myasthenia gravis.

A slight droop is apparent in sympathetic nerve palsy. The reverse process is seen in Graves' disease, where the staring appearance is characteristic, due to the protrusion of the globes, and retraction of the lids, owing to stimulation of the sympathetic system. On making the patient look first up and then slowly down, fixing a pencil held horizontally before the face, it will be noticed that the upper lid lags behind during the downward movement of the globe, allowing an interval of sclera to be seen between the lid margin and the cornea (von Grafe's sign). Blinking movements are less frequent, and imperfectly performed.

Cornea.

Diffuse nebulae, if associated with remains of blood-vessels terminating at the scleral margin, detected by the binocular loupe suggest interstitial keratitis of syphilitic origin.

Phlyctenular ulcers, or small discrete nodules at the corneoscleral margin in children, suggest a toxi-tubercular condition, especially if of frequent recurrence, and resistant to treatment.

The Sclerotic.

Gouty, rheumatic, or infective conditions may manifest themselves in localized nodules or diffuse inflammation of the sclerotic and episcleral tissues.

Iris and Pupil.

Very valuable information as to the existence of disease of the central nervous system may be obtained from accurate investigation of the iris and pupil, the converse is equally true, that very erroneous deductions may be drawn from a casual examination. I would suggest that no verdict be pronounced upon a

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pupil till it has been examined with the binocular loupe—a sluggish reaction, due to senile fibrosis of the iris fibres, will not then be condemned as an inactive pupil, or an inactive pupil, due to post-synechiæ from old iritis of septic origin, be mistaken for one of central origin.

Inequality of the Pupils.

Unequal pupils, often combined with myosis, are found in tabes and G.P.I., but in my experience a very frequent cause is injury, therefore definite questioning on this point must not be omitted, and a careful examination of the pupil margins should be made with the loupe, to note irregularities or tears of the sphincter muscle.

Again, the condition is not infrequently due to an interference with the sympathetic nerve supply to the dilator fibres of the pupil on one side, as, for instance, in cases of pressure on the sympathetic from enlarged cervical glands.

The condition may readily escape notice, but the aspect of the individual that draws attention to the condition is a slight droopiness of one lid, and, on further examination, the pupil is found to be slightly contracted. Compare this with ptosis, and a dilated pupil due to third nerve paralysis.

Periodically contracted pupils in an individual are very suggestive of the morphine habit.

I have so often found, in my post-graduate classes, a certain slovenliness in testing the pupil reactions, and an uncertain interpretation of their meaning, that I trust the following remarks will not be considered too elementary.

The objects in view are to test (1) the efficiency of the light reflex consisting of the afferent path from the retina via the optic nerves and tracts to the third nerve nuclei, and the efferent path, from the third nerve nuclei via the third nerve, ciliary ganglion, and

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matic, suggests third nerve paralysis of syphilitic or cerebral origin; it is also a distinctive feature in myasthenia gravis.

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has his right eye closed. The field of vision of the patient's right eye will correspond with the field of vision of the observer's left eye. The patient must fix without wavering the centre of the observer's pupil. A 10 mm. square of white paper on the end of a pen will readily elicit any gross defect, such as homonymous hemianopia, or bi-temporal loss of fields, which are the two conditions of general diagnostic importance to be sought for. Hypophyseal tumour, with its characteristic loss of perception of colour first, and form later, in both temporal fields—in the earlier stages the upper temporal quadrants alone may be affected—can be diagnosed by this test, and confirmed by this test alone. A central scotoma for small specks of colour, with full peripheral field of vision, suggests tabacco, alcohol, or diabetic poisoning; disseminated sclerosis, retro-bulbar neuritis, as in sinusitis, and occasionally tabes, when the condition is not due to macula disease

Ocular Muscles.

Paralysis of ocular muscles and associated ocular movements is a subject that can only be dealt with briefly

Diplopia is the cardinal symptom, and the lesion may be situated in any part of the nervous tract from the cortex cerebri to the muscles. The general principle is that conjugate ocular movements are cortical in origin, while nuclear and peripheral lesions affect the motility of a muscle, or muscles, of one eye, according to the nerve supply involved

The ætiology of ocular paralysis is the ætiology of intracranial lesions, syphilis and parasymphilis, vascular lesions, tumours, disseminated sclerosis, plus certain peripheral causes, such as diphtheria, "rheumatic" or infective conditions, associated with migraine—recurrent paralysis—it also follows injections into the spinal theca to produce anæsthesia. Injury is especially

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liable to involve the sixth nerve, owing to its lengthy and exposed course; it not uncommonly occurs following fracture of the base of the skull.

Nystagmus.

Nystagmus may be congenital or acquired. The history of the case will help to decide the relevancy of its diagnostic importance. It is a prominent symptom of disseminated sclerosis, cerebellar tumour, and labyrinthine disease, and affects miners owing to the imperfect illumination and cramped posture involved in their work, when it can be looked upon as a form of occupation neurosis. It is more commonly seen in its congenital form due to local ocular defects—it is almost constantly present in albinism, partial or complete.

Errors of Refraction and Muscle Balance.

These are undoubtedly responsible for headache and various algias in a certain proportion of patients suffering from these complaints. The measure of their responsibility must be sensibly weighed in each case, but of recent years there has been a tendency to exaggerate their importance as ætiological factors, and to condemn to a life sentence of spectacles individuals who are suffering from some temporary form of physiological insolvency.

2. INTERNAL EXAMINATION.

Ophthalmoscopic examination of the fundus for the purposes of this paper should be concentrated on the condition of : (1) the optic nerve; (2) the blood-vessels; (3) the retina and choroid.

The Optic Nerve.

There are two varieties of inflammation of the head of the nerve, characterized by swelling and obscuration of the disc margins, which differ widely in

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ætiology, and, consequently, in diagnostic importance. They are differentiated under the headings of papillœdema and optic neuritis.

Papillœdema—The term papillœdema is applied to that condition of the optic nerve where a marked striation of the margins of the disc is found, with definite swelling and elevation of the nerve head above the plane of the retina.

The swelling and striation are due to œdema caused by increased intracranial pressure transmitted to the subdural space of the sheaths of the optic nerves.

The veins are greatly congested, and there may be hæmorrhages and exudates in the swelling, which is limited to the nerve head, although œdema at the macula may be present in the shape of radiations of bright white lines. Frequently there is little interference with acuity of vision.

The ætiology is the ætiology of increased intracranial pressure; intracranial tumour of every description, hydrocephalus, meningitis (especially the tuberculous form), abscess, gumma, and neoplasm. Papillœdema is always specially well marked in subtentorial tumours.

The condition is nearly always bilateral, and the swelling may amount to six or eight dioptries, the nerve head protruding into the vitreous like a mushroom, though the degree of the swelling may vary in the two eyes.

Optic Neuritis.—Optic neuritis is the term applied to a similar appearance of the optic nerve of a less severe character—the swelling never approaches the amount seen in papillœdema, but the retina is frequently involved, exhibiting cloudiness, hæmorrhages, and exudates (neuro-retinitis). In contradistinction to papillœdema the vision is greatly lowered, and the condition is frequently unilateral (when due to focal infection). The ætiology is toxæmic; syphilis, albu-

minuria, diabetes, influenza, and septic conditions in the mouth, nose, and throat, sinusitis, apical abscess of the teeth, etc., are the main causes. Retro-bulbar neuritis with central scotoma is of this description, but ophthalmoscopic changes are limited to the nerve head.

Optic Atrophy.—This must also be subdivided for purposes of contributory diagnosis into primary and secondary.

In primary optic atrophy the disc margins are clearly defined, the disc is of a grey-white colour, and frequently the blood-vessels are unaltered in size and appearance. Tabes and G.P.I. account for the majority of these cases, but the condition occurs in disseminated sclerosis, and as the result of pressure effects or injury. In hypophyseal tumour, optic atrophy is the rule, papilloedema a very rare exception.

In optic atrophy, secondary to previous optic neuritis, owing to inflammatory exudation and subsequent organization of the exudate into fibrous tissue, the disc margins are obscured, the physiological cup is filled in, and the vessels may have sheaths of fibrous tissue along them. In a typical case the conditions are unmistakable, but frequently it is impossible to be dogmatic as to the pre-existence of a neuritis or not.

The Blood-vessels.

Invaluable evidence of general systemic disease may be furnished by the retinal blood-vessels.

Arterio-sclerosis and high blood-pressure can be diagnosed by sight; the thickened arteries can be seen to compress the veins where they cross each other, leading ultimately to obliteration of the lumen of the thin walled vein, and hæmorrhagic leaking along its course. Visible alterations in the calibre of the artery are diagnostic of arterio-sclerosis.

Embolism or thrombosis of retinal arteries or veins

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may throw a valuable light on obscure cerebral conditions due to similar cardiac or vascular lesions.

The Retina

Syphilis, all forms of nephritis, and glycosuria are the principal causative agents of retinal inflammation. A diffuse cloudiness of the retina with optic neuritis and fine vitreous opacities will suggest syphilis. In albuminuric retinitis, variations in details will be found, but the general picture includes papillitis, sometimes of great intensity, resembling that found in cerebral tumour, congestion of the veins, flame-shaped hæmorrhages, and white exudates in the peripapillary area, and a brilliant star formation of radiating white lines at the macula.

In diabetes the changes are somewhat similar, except that papillitis is rare, the hæmorrhages are more frequently seen as discreet round spots, and glistening brilliant white patches and dots are of common occurrence.

The Choroid

Grossly disseminated patches of choroido-retinitis fringed with pigment are a frequent indication of syphilitic infection, whereas larger solitary areas of choroidal atrophy are suggestive of a tubercular origin.

CONCLUSION.

In the foregoing pages I have endeavoured, within the terms of reference, to draw the attention of the traveller to a series of ocular signposts. The ultimate destination may not be inscribed upon any one of them, but by reading them systematically, and not ignoring them, will the journey be wisely and profitably hastened.

Cystoscopy in Diagnosis.

By SIR JOHN THOMSON-WALKER, O B E., M B ,
F R C S

*Senior Urologist and Lecturer on Urology, King's College Hospital ,
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THE cystoscope is the key to diagnosis in diseases of the urinary tract. Without the cystoscope diagnosis in 50 per cent. of cases of urinary surgery is little more than guess-work. With the cystoscope, and especially when ureteral catheterization and X-ray examination are combined with it, diagnosis in diseases of the urinary organs is more accurate and more complete than in any other system in the body.

A few years ago it was no uncommon experience to examine a case of hæmaturia and find that the patient had the scar of a negative renal exploration. Cystoscopy showed a papilloma in the bladder. Such cases do not now exist, for it would be considered unjustifiable to operate on a case of hæmaturia without first cystoscoping the patient.

In my Hunterian lectures for 1907 I collected from the current literature ninety-five cases of operation upon one kidney when anuria and uræmia followed the operation. In these cases no suspicion had been entertained before embarking on operation that a second kidney was not present or, if present, was not sufficiently healthy to maintain the renal function.

These were largely cases of tuberculous or calculous disease, and the second kidney was either absent or the seat of advanced disease when examined after death.

Such operation tragedies are now abolished from urinary surgery by careful preoperative examination with the cystoscope, and the ureteral catheter.

At the time when the question of cystoscoping a patient arises and he presents only a urinary

symptom or a group of urinary symptoms, it is a case of hæmaturia or of pyrexia or of frequent or difficult micturition, or a combination of these symptoms. There is as yet no certain diagnosis.

Or, on the other hand, the case is known to be one of infection of the urinary tract with the *Bacillus coli* or with the tubercle bacillus, and it is proposed to search for the chief focus of infection. Or the diagnosis of disease of one kidney has been made and before operating upon it the presence or absence of disease and the condition of the renal function of the second kidney is to be examined.

I shall discuss the following points :—

1. The investigation of urinary symptoms by the cystoscope.

2. The estimation of the renal function by the cystoscope

1. THE INVESTIGATION OF URINARY SYMPTOMS BY THE CYSTOSCOPE.

(a) *Hæmaturia*.—Hæmaturia is usually intermittent. It is a symptom, not a disease, and the clearing of the urine does not mean the cure of a disease. Unfortunately the patient, and not infrequently the practitioner also, finds difficulty in realizing this point, and it is only after repeated attacks of hæmaturia and a considerable period of time has elapsed that the patient is submitted to complete examination by the cystoscope.

In a case where hæmaturia is the principal symptom two problems arise. First, the localization of the bleeding to one part of the urinary tract; and second, the investigation of the cause of the bleeding. These two points may be settled simultaneously, or the bleeding may be localized (say, to one kidney), but the actual cause remains obscure.

The presence of other symptoms may suffice to

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ceased at the time of the cystoscopy, there is no clue as to which kidney has been bleeding. There are cases of symptomless hæmaturia when the bleeding is evanescent and has ceased at the time of the cystoscopy. These are serious cases. In some the bleeding is of the type we know as "essential hæmaturia," for want of a better name. There is bleeding from a kidney which shows even on removal no recognizable disease. But some of these are cases of early growth in the kidney. There is a very great danger in these cases that the rapidly disappearing hæmaturia may be neglected, and I have seen a number of cases in which this has happened and the patient has eventually come with a growth of the kidney so advanced as to be inoperable.

In one case the patient, tired of repeated attempts to locate the hæmaturia, and always somewhat sceptical as to whether his doctor or surgeon knew as much as he did, resorted to treatment by an osteopath who, nothing loth, beat his back with a hammer with the object of replacing a supposed displaced vertebra. After many months of this treatment the hæmorrhage became serious and continuous, and he returned to have a further surgical examination. By this time the right kidney was much enlarged, and the patient obviously emaciated. I removed the kidney, but there were secondary deposits in the abdominal glands, and the patient died six months later.

In renal hæmaturia it is necessary to find out as soon as possible which kidney is bleeding. For this purpose the surgeon, the practitioner, and the patient must arrange that when blood reappears in the urine cystoscopy must be carried out at once. Even with careful arrangements for this purpose the bleeding may cease before the cystoscopy, and it may require many attempts before blood is seen to issue from one ureter.

In a case of intermittent renal hæmaturia, where the bleeding has ceased, and the urine appears clear to the

naked eye, there may still be a few red-blood corpuscles in the centrifugalized deposit of the urine. If a ureteral catheter is very carefully passed, and a specimen of urine obtained from each kidney, the blood-cells may be found in the specimen obtained from one kidney, and not in that from the other. Unfortunately this method is apt to be fallacious, for the passage of the catheter, even when gently and skilfully carried out, may cause very slight bleeding and vitiate the result.

Something may be gathered from the presence of fresh blood corpuscles indicating recent bleeding as from the effect of the catheter or decolorized blood corpuscles, or "ghosts," pointing to a bleeding which occurred before the catheter was introduced. In one case there were peculiar fatty cells in the specimen from one kidney and none in that from the other.

Relying upon this I operated and found a large growth which could not be felt through a very thick abdominal wall. If, on passing the ureteral catheter, there is an immediate flow of blood in quantity, and especially if the blood is dark in colour, the side of the hæmaturia is definitely demonstrated.

Pyelography consists in passing a fine catheter up the ureter to the renal pelvis, and introducing a fluid (sodium bromide, 20 per cent) opaque to the X-rays. By this means a silhouette of the renal pelvis and calices is obtained. The distortion of the shadow caused by a renal growth projecting into the renal pelvis can be recognized. This method is of great value in intermittent hæmaturia, when the side of the hæmorrhage is known or suspected, and I have operated on a growth of the renal pelvis where the evidence consisted in a previous attack of renal hæmaturia, a slightly reduced urea content of the urine on one side, and a peculiarly distorted renal pelvis as shown in a pyelogram.

(b) *Pyuria*.—The localization of pyuria is equally

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important with that of hæmaturia, for successful treatment of the infection causing it depends upon the diagnosis. Usually there is definite pain that will assist. There are, however, many obscure cases where the source of the pyuria can only be discovered by the use of the cystoscope and the ureteric catheter. An attempt will first be made by abdominal palpation and examination of the prostate and seminal vesicles to ascertain whether the chief focus of inflammation is in the upper (kidneys, renal pelvis, and ureters) or the lower urinary tract (bladder, urethra, prostate, vesicles), and an X-ray examination may be necessary.

Cystoscopy will show whether the source of the pyuria is in the bladder, and due to such conditions as stone, diverticulous growth, enlarged prostate with residual urine, or a sacculated bladder.

On examining the ureteric orifice there may be some change such as inflammation surrounding the orifice, swelling of the lips, a rigid open orifice, or a displaced tunnelled orifice which indicates that the source of the pyuria is the kidney of this side. The efflux may be purulent. A slightly cloudy efflux is very difficult to recognize as the bladder is usually inflamed and forms a dull, light-absorbing background against which to view the jet of urine. When, however, the efflux under examination momentarily clouds the field, obscuring everything, and clearing again, the presence of pus in the urine of that kidney is definitely proved. When the urine is thick with pus, and when in the advanced stage of pyonephrosis, the pus is squeezed out of the ureter at intervals like lanoline out of a collapsible tube, the source of this pyuria is easily recognized.

In many cases the ureteric catheter is necessary in order to localize the pyuria, and even when pus is definitely seen in the urine of the kidney it may be necessary to obtain a specimen of the urine of the opposite kidney to ascertain if infection is present in

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that kidney also, and possibly also to investigate the function of the kidney.

(c) *Frequent Micturition*.—Frequency of micturition is so closely allied to pyuria that what has been said in regard to pyuria applies also here. There are, however, cases in which the pyuria is minimal, or completely absent, and frequent micturition is pronounced. These are often difficult cases for diagnosis and treatment. In women there may be very distressing frequency of micturition with little, if any, change in the urine. An intermittent or a constant bacilluria may be present without cystitis or pyuria, but with intense irritation. On cystoscopy the bladder will be found healthy, or shows only a little reddening at the base.

A condition known as trigonitis is very common in women. It is usually due to a mild, ascending infection, and as the name indicates, affects the trigone. The urine contains a few bacteria (*Bacillus coli* or staphylococcus), and the cystoscope reveals a reddened trigone, which is frequently covered with a fine whitish film. In a more severe form I have seen the trigone intensely inflamed and covered with large shreds of desquamated epithelium.

In a condition known as cystic cystitis there are numerous small sago-granlike bodies on the mucous membrane, and grouped especially at the base. There may be no inflammatory change, and the urine may be sterile or mildly infected. The condition is usually accompanied by intense neuralgic pain and frequent micturition.

In other cases of persistent frequency of micturition there is universal dilatation of the vessels of the mucous membrane without inflammation.

(d) *Urinary Obstruction*—Obstruction in the urinary tract may be in the urethra or the ureter. Urethral obstruction is due to stricture or enlarged prostate.

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The diagnosis of stricture is made by other methods, and need not be discussed. Where there is pronounced enlargement of the prostate, cystoscopy is better avoided, owing to difficulty in introducing the instrument, the likelihood of bleeding, and the reflex effect on kidneys already damaged. Further, it is rare that any useful object is gained by the examination in such a case. When, however, the change in the prostate is slight, and there is a reasonable doubt whether the symptoms are due to the prostate or to some other undiscovered cause, cystoscopy is invaluable.

In moderate enlargement of the prostate, changes are seen at the internal meatus. There may be a projecting rim all round the meatus, or the posterior lip may show a projecting wound or a definite wounded lobe. Or two lobes may project, so that they form a Λ shape when the cystoscope is partly withdrawn into the urethra with the window looking forward.

The ureteric orifices may be seen with difficulty over the top of the prostate, and this is a measure of the intravesical projection.

In the absence of definite intravesical projection other conditions, such as cyst of the prostate or a diverticulum of the bladder, may be discovered.

Obstruction of the ureter may be due to stones or stricture, or to some kink produced by adhesions, or to the presence of an aberrant renal vessel.

The absence of an efflux and of any movement at the ureteric orifice does not prove an obstructed ureter, for the ureter may remain quite still for some minutes under observation. Gentle massage of the kidney may stimulate the renal pelvis and ureter to contract and produce an efflux at the ureteric orifice.

Chromocystoscopy is a useful method of examining the ureteric efflux. By this method, which will be described later, a lazy trickle of blue urine may be seen

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at the orifice of the obstructed ureter, and compared with the full vigorous jet of the sound ureter. When the obstruction is complete the efflux will be absent.

The passage of a ureteral catheter or bougie is a further aid in the diagnosis.

The catheter is arrested at the point of impaction of the calculus or the site of the stricture. A catheter may, however, be arrested by a fold of mucous membrane, or by a spasm of the ureter, without any permanent obstruction being present. This occurs most frequently in the lower one or two inches of the ureter. Occasionally a catheter of small size will pass when a large one has failed.

The catheter may pass by an impacted stone after slight hesitation, and on withdrawing the instrument a peculiar dragging sensation is felt.

When the obstruction is at the outlet of the renal pelvis the catheter will usually pass into the pelvis although the urine is completely retained.

Pyelography gives invaluable assistance in the minor degrees of hydronephrosis

2 ESTIMATION OF THE RENAL FUNCTION BY THE CYSTOSCOPE.

I have already insisted on the necessity of examining the renal function of one kidney before performing an operation on its neighbour. For the examination of the total renal function performed by the combined kidneys cystoscopy is not necessary.

For the separate examination of the function of one kidney two methods are available.

(a) Chromocystoscopy.

(b) Catheterization of the ureter

(a) *Chromocystoscopy*.—Chromocystoscopy consists in injecting 20 c. cm. of a saturated solution (0·4 per cent) of indigo-carmin into a muscle and examining the bladder with a cystoscope. After 12 to 20 minutes the

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urine becomes tinged with blue, and after three-quarters of an hour it is a deep blue colour. Examination of the efflux at each ureter will show a jet of dark blue urine.

Delay in the appearance of the blue, a fainter staining of the urine, or the complete absence of blue colour on one side, is taken to show a diminution or absence of the functional power of the kidney. This method is extremely useful when a rapid proof of the presence of a functional kidney is required, but it is not sufficiently reliable for accurate work on the renal function.

An important use of chromocystoscopy is when a fistula of the ureter has followed hysterectomy and opens in the scar in the vault of the vagina. The surgeon is uncertain which ureter is fistulous. With chromocystoscopy the healthy ureter will be seen to discharge a deeply stained efflux while the efflux is absent on the injured side. Chromocystoscopy may also be used as an aid to finding the ureteric orifice when the bladder is diseased.

(b) *Catheterization of the Ureter.*—A sample of urine may be obtained from each kidney by catheter and the percentage of urea examined. This is sometimes useful in demonstrating the diseased side in a doubtful case.

When one kidney is known to be diseased and an operation on it is to be performed, the function of the second kidney should be accurately examined. This is best carried out by combining the urea concentration test with catheterization of the ureter. A draught of urea (15 grams) is given by the mouth after abstinence from fluids for 8 or 10 hours.

The ureter of the supposed healthy kidney is catheterized during the second hour after the administration of the draught, and a sample of urine from the kidney obtained, and the percentage of urea in it examined. This will show the full capacity of the kidney to excrete urea.

Blood Pressure in Diagnosis.

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A DEGREE of blood-pressure that shall ensure a due supply of blood to the vital centres is essential to the continuance of life, and this being so, the "call" of these centres upon the circulating mechanism to activities and adaptations under varied general conditions and local impediments is imperative. In diagnosis we have to endeavour to interpret the meaning of any diversion of blood-pressure from the normal, regarding the sign in itself as an index, rather than as a primary factor, in the symptomatology of the case before us.

The mean pressure of blood within the vessels is primarily due to the rhythmic contraction of the ventricles of the heart and the elastic recoil of the arteries against the closed aortic and pulmonary valves. The current is distributed and expended in its passage onwards to the veins, but its escape through the arterioles is regulated by their contractility which varies in degree from that of mere *tonus* to almost complete closure, and each organ is, so to speak, rationed of blood supply by vaso-motor control. By the time the blood arrives at the venous capillaries its onward impulse (the *vis a tergo*) is almost exhausted. A certain reaction within the capillaries between the blood and tissue elements, which has for its object the absorption of nutritional, and the excretion of more or less effete materials, probably acts on balance in advancing the current onwards through the venules, and

as it gathers volume in the wider veins it is further urged forwards by the pressure derived from adjacent muscular action directed by the venous valves until finally, at the auricles, it is propelled by their contraction into the ventricles. The lymph stream in its ebb and flow has its tidal influence upon the blood volume and pressure. A constant and not unimportant aid to the returning current is the aspiration towards the mediastinum caused by the elastic traction of the lungs, reinforced by the expansion of the thorax during inspiration. This aspiratory force is, of course, in action against arterial output, as well as in favour of venous return, but is only effectively operative upon the sluggish current of return in the larger veins.

The mean result of these several forces and retardations is the condition of general pressure under which the circulation of the blood is maintained and is spoken of as the *medium*, or less accurately as the *diastolic* blood-pressure. The impetus derived from ventricular contraction is that pulsatile addition to the mean which constitutes the *maximum* blood-pressure. This addition is called the *pulse pressure*.

The older physicians were quite aware of heightened conditions of blood-pressure which they described as "plethora with bounding pulse," "incompressible pulse," etc. The term incompressible is still used to denote that condition of pulse indicative of high arterial pressure in which, when the radial artery is absolutely closed by the compression of the finger, the vessel beyond will still be found to be full and pulsating. Carefully testing with the second finger, however, it will be noted that the impulse comes from the peripheral side, and it is at once stopped by compressing the ulnar artery.

An appreciation of the pulse includes an estimation of its tension, and only in some five or ten per cent of our patients is an instrumental examination of blood-

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from the pulse through the skilled finger; they are of value as permanent records and as testing, and sometimes correcting, pulse observations. A pocket instrument has been designed to obtain similar pressure records directly from the radial artery, which is convenient, perhaps, for rapid work.

The normal blood-pressure varies with age, and there are diurnal variations—some increase after meals, during exercise, and some diminution with fasting. These normal fluctuations may amount to 10 or 15 milligrammes, but these allowed for on one side or the other, the pressure is fairly constant for the individual and according to age. (I am speaking clinically, for the purposes of physiological inquiry, of course, attention to minute details and conditions of variation would be necessary.)

For male persons under the age of thirty the average mean blood-pressure is 80 mg., the maximum 120 to 130. The minimum pressure is some 10 mg. below the mean. Between the ages of thirty and fifty the mean pressure rises somewhat towards the latter age to 85 or 90, and the maximum to 130 or 140. Between the ages of fifty and sixty-five the mean may be 85 to 95, maximum 140 to 160. With females the pressure ranges about 7 mg. less than in males. Oliver takes 45 mm. as the average pulse-pressure, which increases 1 mm. every two years from ages forty to sixty, and each year after sixty. Bearing these general points in mind we would regard a maximum pressure of 150 in a man below the age of fifty or of 160 beyond that age as requiring investigation. Under morbid conditions the maximum pressure may rise to over 200 mg., and the mean to over 100.

It is of importance in taking pressure records—as in estimating the pulse—to take into consideration such circumstances as food, exercise, or mental excitement or depression, which may render some allowance

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necessary, and only by repeating observations at different times can a perfectly satisfactory record be ensured. In examining for life assurance, however, only one observation is, as a rule, possible, and a note of any disturbing conditions of a temporary character should be appended to the record.

A blood-pressure observation is only one item in the presentment of a case. This being remembered, we may ask what is its value. There is probably no such thing as an idiopathic "hyperpiesis," a term under which Faught endeavoured to differentiate a purely functional hypertension, although he admits it to be always a sign of the beginning of a pathogenic change. The nearest approach to such may, perhaps, be found in premenstrual and climacteric high pressures, and in those of emotional origin, including some cases of pseudo angina, all associated with temporary vasomotor constriction of arterioles.

1. A normal record is evidence *pro tanto* that the heart and vessels are sound, and that there is no toxic or other condition of the blood to increase the resistance to its passage through the small vessels, nor any reflex or mental cause to excite the contraction of the arterioles.

2. A diastolic pressure relatively high to the maximum indicates that with increased resistance the margin of heart-power is diminished. On the other hand, a high maximum with a relatively low diastolic pressure, i.e. a high pulse pressure, if it be not accounted for by some emotional relaxation of arterioles with excitement of heart, points to some defective support to the circulation as from impairment of aortic valves permitting regurgitation, causing an extra demand upon the cardiac systole.

3. The conditions of the vessels must be examined as to whether there be hardness and thickening present, tortuosity of the temporals, or undue visibility of the

radial and brachial arteries, and want of elastic adaptation of the latter when the arm is flexed.

4. Any enlargement of heart, displacement of apex beat, *excited* or hypertrophic impulse, or evidence of any cardiac defect or insufficiency of valves will be looked for. Accentuation, and often reduplication, of the second sound may generally be observed with high blood-pressure.

5. Mental conditions have a very decided influence on blood-pressure. Lord Dawson,³ investigating the blood-pressure of 650 school children between the ages of 10 and 17, observed a heightened pressure in a larger proportion of those entered for the higher examinations, which he regarded as due to continued intentness and anxiety, an existing state of mind intensified by straining. What may be described as mental harassment, overstrain of work, and especially anxiety of work, the repeated need for rapid and critical decisions such as obtain in the crowded and responsible lives of many professional and business men, are fruitful causes of arterial tension. Premature arterial changes are prevalent amongst such persons, but the first sign of danger is an excessive range of arterial pressure. It must not be forgotten, especially in the guidance of these cases of strenuous vocations, that they are not uncommonly accompanied by irregular meals, rapid eating, dietetic indiscretions, and often irregularity or excess in alcohol. Certain people are temperamentally disposed to take life at high pressure, and unquestionably premature arterial changes are observed in certain families. Nerve shocks, whether emotional or from such lesions as perforation of the pleura or peritoneum, inhibit the heart's action and cause lowering or collapse of pressure.

6. Varied sources of toxæmia will be considered—defective metabolism. Overweight is frequently asso-

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ciated with heightened blood-pressure and requires very careful assessment in life assurance.

The state of the gums and fauces must be examined for pyorrhoeal or other septic conditions, and the teeth looked to, as a source of reflex irritation.

7. In all cases of heightened blood-pressure it is important to examine carefully into the abdominal condition. Defective function of the colon is a frequent source of disturbance. The toxins absorbed from the lower bowel seem to be the offending agents.

8. A low range of specific gravity of the urine in the presence of a raised blood-pressure is a hazardous combination suggesting interstitial nephritis. A high range of specific gravity with lithiasis is of less grave significance, suggesting excess of diet, defective exercise, etc., which can be corrected. Gouty and glycosuric conditions of urine are commonly associated with increased pressure of blood, whilst in the genuine forms of diabetes I would say that the pressure is lowered, but I have no records to confirm this.

9. The cancerous cachexia and all cases of visceral cancer are attended with a lowered arterial pressure. External cancer in the earlier stages is not so attended. Tuberculosis in the acute phases of the disease causes a lowered pressure, but in chronic and quiescent periods of the disease the blood-pressure is fairly well sustained. It is in marked contrast with cancer in this respect.⁴ All acute infections are associated with a depressed blood-pressure, probably from the immediate effect of the toxins upon the cardiac musculature. Influenza and diphtheria poisons are especially venomous to the heart. Disease of the suprarenal glands, which are probably the media through which the causes of altered arterial pressure become effective, is attended with depressed blood-pressure. There does not seem to be sufficient evidence in cases of extra blood-

radial and brachial arteries, and want of elastic adaptation of the latter when the arm is flexed.

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symptomatology. Languor, headache, breathlessness on exertion, a certain sense of fullness behind the eyes, insomnia with undue pulsation of heart at night, occasional epistaxis, or other spontaneous mucous hæmorrhages, are amongst the few symptoms for which moderate degrees of high pressures are directly accountable.

Blood-pressure is, however, sometimes so excessive as to give rise to urgent symptoms which require immediate relief. Such symptoms may occur at any time with a range of pressure of 180 or higher. Severe epistaxis, or bronchial hæmorrhage, temporary asphasia, coma, or actual cerebral hæmorrhage, are not infrequent occurrences. Acute œdema of the lungs and threatened heart failure with anginal symptoms are also amongst the grave direct results of excessive pressure. A great temporary excess of albuminuria is sometimes observed.

The line of treatment of disordered arterial pressure is, for the most part, sufficiently indicated by the conditions I have enumerated as underlying the symptom. Its discussion at any length is beyond the scope of this article.

An efficient calomel and saline purge is indicated in any threatening of direct symptoms, and an occasional mercurial with intervening saline laxatives should be given. Vaso dilators should be avoided unless it be for the occasional relief of headache or insomnia by aspirin and phenacetin. It must not be forgotten that hypertension is often the means of maintaining organic function. This is especially the case in chronic nephritis, and must be taken carefully into account in treatment.

The treatment of any serious case should begin with a period of complete rest on a milk diet. The régime of life must be carefully overhauled and corrected. A course of Nauheim baths, with massage, may be

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pressure of suprarenalism analogous to thyroidism, but there is unquestionable evidence of the opposite condition in the collapse of arterial pressure which attends the impaired function of the adrenals in Addison's disease.

10. Alcoholic excess tends rather to lower pressure unless in moments of excitement or when accompanied by organic changes, especially in the kidneys. Excess of smoking tends to raise blood-pressure rather in a spasmodic way through irregular contractions of the arterioles, but later, it may be, from arterial changes. In other cases by depressing heart-power it has a lowering effect.

11. As might be supposed, cardiac diseases are attended with characteristic differences of intra-arterial pressure. It may generally be said that with a moderate maximum pressure for the age of the patient, and with a sufficient allowance of some 40 mgrs. between the maximum and the mean pressures, the cardiac function is effectually performed. In cases of mitral regurgitant disease the pressure is, as a rule, lowered. But it must be remembered there is nothing "ca' canny" about the heart; it can be trusted to deliver the uttermost output it is capable of, and the tendency is to an excessive effort beyond the actual need of the impediment. In aortic regurgitation the maximum pressure is high, the medium pressure relatively low, i.e. the pulse pressure is increased.⁶ Probably the peculiar distress that precedes the appearance of dropsy in many heart diseases, especially mitral regurgitation, is associated with a high diastolic with relatively low systolic pressure, the onset of dropsy relieving pressure and restoring the effective balance of pulse pressure.

I have gone some way fully into the conditions which may attend and have an inverse relationship to altered blood-pressure, so that need further be said upon the subject.

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symptomatology. Languor, headache, breathlessness on exertion, a certain senso of fullness behind the eyes, insomnia with undue pulsation of heart at night, occasional epistaxis, or other spontaneous mucous hæmorrhages, are amongst the few symptoms for which moderate degrees of high pressures are directly accountable

Blood-pressure is, however, sometimes so excessive as to give rise to urgent symptoms which require immediate relief. Such symptoms may occur at any time with a range of pressure of 180 or higher. Severe epistaxis, or bronchial hæmorrhage, temporary asphasia, coma, or actual cerebral hæmorrhage, are not infrequent occurrences. Acute œdema of the lungs and threatened heart failure with anginal symptoms are also amongst the grave direct results of excessive pressure. A great temporary excess of albuminuria is sometimes observed

The line of treatment of disordered arterial pressure is, for the most part, sufficiently indicated by the conditions I have enumerated as underlying the symptom. Its discussion at any length is beyond the scope of this article.

An efficient calomel is given. Vaso dilators should be avoided in any threatening of direct cerebral hæmorrhage. Mercurial with intervening salivary catharsis is given. Vaso dilators should be avoided for the occasional relief of headache or insomnia. Aspirin and phenacetin. It must not be forgotten that hypertension is often the means of maintaining organic function. This is especially the case in chronic nephritis, and must be taken carefully into account in treatment.

The treatment of any serious case should begin with a period of complete rest on a milk diet. The régime of life must be carefully overhauled and corrected. A course of Nauheim baths, with massage, has been

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advised, especially when capillary circulation appears at fault, but only after a preliminary treatment by restricted diet and purgatives. The baths at Aix-les-Bains, Nauheim, Llandrindod Wells, and Woodhall Spa may be mentioned amongst those suitable in such cases.

For such urgent and dangerous occurrences as coma, severe bronchial hæmorrhages, or acute œdema of lungs, prompt venesection is called for. Epistaxis should be encouraged rather than checked, within reasonable limits. In cases in which fibrosis of the kidney is distinctly recognized, the question of decortication of the kidney is important for consideration.

When anginal symptoms are associated with pulmonary œdema a moderate dose of morphine with atropine is very useful.

Let me repeat with emphasis Increased intra-arterial pressure is a symptom, not a disease, although, like other symptoms, it may become so predominant as to require direct interference. It must be regarded in due co-ordination with all other symptoms of organic unsoundness or ill conditions of life, of which it is often the first danger signal. In many cases its direct effect is compensatory, sustaining function under difficulties, and so it must rarely be isolated for attack in treatment.

References.

¹ Some authors regard the minimum as the diastolic pressure, but practically the minimum recorded, whether estimated by the auditory method or the character of needle fluctuation, is higher than that at which pulsation first appears. ² A full description of all modern methods is given in Dr Halls Dally's book on "High Blood Pressure," 1923. He also gives full references to the literature. Faught and Oliver are the classical authorities on the subject. ³ Lord Dawson. Paper read at the Bath meeting of the British Medical Association (*B M J*, Aug 1895, p 197). ⁴ A Lecture on The rôle of the Cardio-Vascular System in Pulmonary Tuberculosis delivered at the Brompton Hospital (*Lancet*, 1916 p 14155). ⁵ "On Aortic Regurgitant Disease with Reference to Insurance Cases." *THE PRACTITIONER*, May, 1923.

Examination of the Heart by the Electro-Cardiograph.

By FREDERICK W PRICE, M.D., F.R.S.E

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IT is generally agreed that within recent years there has been a great advance in our knowledge of cardiac disorders, and this advance has been of so practical a character and of such vital importance with regard to diagnosis, prognosis, and treatment, that it is the duty of every clinician to make himself acquainted with its nature and scope. Three examples of this may be cited :

(1) The subject of irregular action of the heart in persons who may or may not exhibit evidence of organic heart disease has been notoriously a source of perplexity and difficulty to the clinician, for it was known that this in itself might, on the one hand, signify definite and even serious impairment or disease of the heart, or, on the other hand, that it might be of no practical importance. We are now able to classify almost every case of irregular action of the heart into types, and we know what each signifies, so that when a patient exhibits it we can, with confidence, form an accurate opinion of his case.

(2) Another problem has been the extraordinary difference in the results of the administration of digitalis, or one of its allies, in persons who are suffering from identically the same lesions, and complaining of precisely the same symptoms. It is of great importance to the practitioner to realize that this problem has been

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to a great extent solved. Put briefly, those cases of cardiac failure which show wonderfully good results are, in the vast majority of instances, cases of auricular fibrillation, or of auricular flutter, in either case accompanied by a rapid ventricular rate

(3) The third example is with reference to cardiac failure. It is agreed that the essential cause of this lies in the heart muscle. Now, if this view be correct, valvular defects, diseased conditions of the blood vessels, and disturbances of the cardiac mechanism should be regarded from the point of view of the relation which they bear to the myocardium, rather than as specific affections in themselves. It should always be remembered that there are as a rule along with the valvular lesion coincident changes in the cardiac musculature. In all cases of valvular disease, therefore, it is of the utmost importance that we should endeavour to ascertain whether the lesion which has invaded the valve has also affected the myocardium, and to what extent, and whether the lesion which is present is progressive. There has been a marked increase in the means at our disposal within recent years.

The great advance in our knowledge of cardiac disorders has been mainly due to the introduction of the clinical polygraph and the electro-cardiograph in the examination of the cardiac mechanism.

It may at this stage be advisable to mention briefly some anatomical and physiological considerations. That part of the auricle which is situated at the junction of the chamber with the great veins is called the sinus part. In it there is a small node of specialized tissue, called the sino-auricular node. There is another small node of specialized tissue situated in the septal wall of the right auricle, this is called the auriculo-ventricular node. Leading from this node is a bundle of tissue connecting the auricles and the

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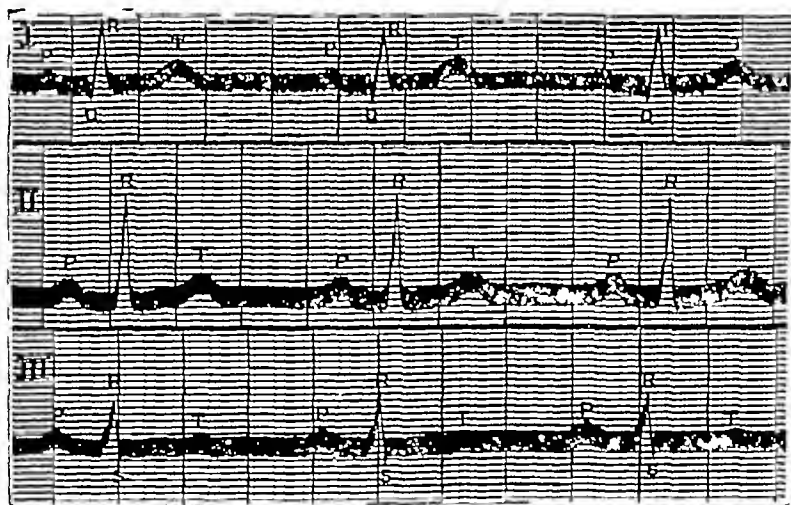
ventricles. It passes forwards in the inter-auricular septum, divides into two branches, the right and left septal divisions, one of which goes to the right and the other to the left ventricle, each ending in the ventricular musculature by widespread subendothelial ramifications—the Purkinje fibres. When the heart is going to contract, the stimulus for contraction arises normally at the sinus, and there is reason to believe that it begins in the sino-auricular node. From this point the stimulus spreads rapidly over the auricles, and auricular systole takes place. It then travels through the auriculo-ventricular node, along the auriculo-ventricular bundle, its two main branches and their subendothelial ramifications, and is thus distributed to the ventricles, the ventricles contracting only in response to stimuli received from the auricle. But while normally the stimulus for contraction rises in the sinus part of the auricle, if any other portion of the heart becomes more excitable the stimulus for contraction arises at this point. The stimulus for contraction is conveyed from fibre to fibre by means of a specialized function of the cardiac muscle-fibres called conductivity.

By means of the clinical polygraph we are able to obtain records of the movements of both auricles and ventricles. We are also able to measure the function of conductivity of the auriculo-ventricular bundle above its division into two branches. The clinical polygraph often affords—directly, or by inference—valuable information regarding the state of the myocardium.

It has been known for a considerable time that changes in electrical potential take place in the muscle when it contracts, and, further, that a record of these changes may be obtained by connecting the muscle with a sensitive galvanometer by means of electrodes. A. D. Waller, in 1887, employed a capillary electrometer to register the changes in electric potential in the human heart during contraction. He demonstrated

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that these changes were distributed through the body, and he used the moist skin surfaces of the arms and legs as leads, connecting them with a galvanometer. Einthoven employed the string galvanometer to register the changes in electric potential in the human heart. He modified this instrument, the Einthoven string galvanometer being now generally employed in physiological and clinical investigations. The record of the changes in electric potential which take place in the heart during contraction is called an electro-cardiogram. If a normal electro-cardiogram be studied, certain upward and downward deflections are seen in each cardiac cycle, the former being the more important. The first deflection, P, is due to the contraction of the auricles. Q, R, S, and T are due to the contraction of the ventricles. R and T are the most constant deflections, the former



more specially so, Q and S are not infrequently absent. P is a small, blunt and rounded upward deflection. Q and S are downward, steep deflections, usually of small amplitude. Q passes at once into R, which is an upward sharp spike, and of greater ampli-

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tude than any of the other deflections. If S be present it follows immediately upon R. T is a prominent, broad, blunt deflection. It is an upward deflection in lead II; it is almost always an upward deflection, but may be inverted, in lead I; and is not infrequently inverted in lead III. It is said that the inversion of T in lead II is always pathological, and in lead I nearly always so. If P or R be a downward deflection in lead I, II, or III, it is abnormal. The time-distance between the beginning of P and the commencement of Q, or between P and R, as the case may be, is a measure of the function of conductivity of the auriculo-ventricular bundle above its division into two branches. It is called the P-Q or P-R interval. The initial group of ventricular deflections (Q, R, S) corresponds to the initial events of ventricular systole—in other words, to the spread of the wave of excitation in the ventricular muscle. The period of time occupied by this group is of great importance, being a measure of the time during which the various parts of the ventricular muscle are passing into activity. It is normally not more than one-tenth second. If it is increased it indicates a delay in the conduction of the wave of excitation through the ventricular muscle. The period between the S and T corresponds to the time during which the main mass of the ventricular muscle is in contraction.

The form of electro-cardiographic curves depends upon the point of origin and path of conduction of the stimulus for contraction; any departure from the normal in respect of either of these will, therefore, result in a corresponding alteration in the form of the electro-cardiogram. A normal P signifies that the stimulus for contraction arises in the remains of the sinus venosus at the orifices of the great veins, and that from this point the stimulus spreads over the whole of the auricles in the usual manner. When P is abnormal,

as, for instance, inverted, it is believed that the contraction of the auricle has commenced at some site other than the sino-auricular node.

As in the case of the clinical polygraph, by means of the electro-cardiograph we are able to obtain records of the movements of both auricles and ventricles, and also to measure the function of conductivity of the auriculo-ventricular bundle above its division into two branches. In addition, it tells us the point of origin and path of conduction of the stimulus for contraction, and also affords information of the function of conductivity of the auriculo-ventricular bundle *below* its division into the two main branches—that is, after its entrance into the ventricular muscle.

All cases of cardiac irregularity, apart from comparatively rare exceptions, fall into one of six groups: The so-called sinus irregularity, irregularity due to premature contraction or extra-systole; irregularity due to heart-block, irregularity due to alternation of the heart, irregularity due to auricular fibrillation; and irregularity due to auricular flutter. A diagnosis of sinus irregularity may be made by auscultation, or by a study of a sphygmogram, or by a polygraphic or electro-cardiographic record. In the great majority of cases of extra-systoles a correct diagnosis can be made simply by palpation and auscultation. They may be recognized with certainty by means of the clinical polygraph or the electro-cardiograph. The first grade of auriculo-ventricular block can only be recognized by means of either the clinical polygraph or the electro-cardiograph, and this applies to a large proportion of the other grades. In this connection it is important to note that the occurrence of partial heart-block during the course of an acute infective disease is a sign, and may be the only sign, of myocardial involvement, and that digitalis is contra-indicated in the first two grades of partial heart-block. A

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lesion of either the right or left main branch of the auriculo-ventricular bundle, and also defective conductivity of their subendothelial ramifications, can be recognized by means of the electro-cardiograph alone. This is of the utmost importance as affording information of the condition of the myocardium. The prognosis in the case of the first is usually very unfavourable, and in the case of the second it is almost always grave. In the great majority of cases of alternation of the heart it is necessary to take a tracing of the radial artery or an electro-cardiogram. When alternation occurs apart from severe tachycardia, it is an indication of extreme exhaustion of the heart muscle. We may be reasonably certain of the existence of auricular fibrillation from the mere presence of complete irregularity of the pulse. The condition can be diagnosed with practical certainty on polygraphic examination, and with absolute certainty on electro-cardiographic examination. The diagnosis of auricular flutter is usually impossible without the employment of the polygraph or electro-cardiograph, and frequently a correct diagnosis cannot be made with certainty even though the former instrument be employed, an electro-cardiographic examination being necessary. The diagnosis of paroxysmal tachycardia can usually be made without instrumental means, and in a still larger proportion with the aid of the clinical polygraph, but by means of the electro-cardiograph it is possible to diagnose all cases, and also to ascertain the site from which stimuli for contraction arise in each case.

The electro-cardiograph only occasionally offers help in the diagnosis of chronic valvular disease. In mitral stenosis the amplitude of the deflection P is often markedly increased. While this is especially so in mitral stenosis in which there is hypertrophy of the auricle, in my opinion it is not justifiable to diagnose the lesion from this alone. Not infrequently the de-

deflection P is broad, has a flat top, and is bifurcated. These features, when present, are of diagnostic value. It is said that an increase in the amplitude of the deflections is often found in congenital heart disease. This does not agree with my experience. In transposition of the heart all the deflections of the curves from lead I are inverted. This is the most valuable diagnostic sign at our disposal.

Recently, quinidine sulphate, administered by the mouth, has been employed in the treatment of persistent auricular fibrillation, and of persistent auricular flutter, with the object of restoring the normal rhythm. If this method of treatment is adopted, frequent electro-cardiographic or polygraphic examinations, preferably the former, are advisable, as the drug should be stopped if the auricular rate falls to 250 or 240 per minute—because of the risk of inducing 1:1 rhythm, or, as a rule, if the ventricular rate rises above 160.

It will thus be seen that clinical electro-cardiography affords the best method of investigating disordered cardiac mechanism, and, indeed, is frequently essential. It gives evidence of left- or right-sided preponderance when either exists, it is occasionally of value in the diagnosis of chronic valvular disease, it contributes the most certain sign of transposition of the heart, and is a valuable aid in quinidine therapy. Most important of all, it is the most precise means at our disposal of investigating the functional efficiency of the all-important heart-muscle itself. It may be confidently stated that in our study of cardiac disorders the electro-cardiograph gives us fuller information in the vast majority of cases, that this information is important in a large proportion, and not infrequently is indispensable.

The Use of Test-Meals and Duodenal Tubes in Diagnosis.

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THE analysis of the contents of the stomach removed at one or more definite intervals after the ingestion of a "test-meal" gives one some idea of the secretory and motor activities of the stomach and, perhaps, more nearly of the functioning of the pyloric mechanism. The information so obtained is often of use in diagnosis, but is of even greater use in affording direct indications for a rational treatment.

Test-meals varying in complexity and elaboration have been employed at different times by different observers, but to-day two only are at all generally used, namely, the test-breakfast of Ewald, and the gruel-meal of Rehfuess. The test-meal must be given in the morning at 8 a.m. or 9 a.m., on the empty, fasting stomach, and in either case the emptiness of the stomach must be assured by the passing of a stomach-tube immediately or some short time before the ingestion of the meal, and any residual contents removed, and in case of any doubt the stomach should be further washed out with warm water. The residual stomach-contents so obtained frequently provide important diagnostic information.

A large quantity, say 200 c cm or more, would suggest some degree of pyloric obstruction, as also, would the presence of debris of some particular food taken a day or more previously. The characters of

the material might indicate the nature of the obstruction: a clear or slightly-turbid, yellowish acid fluid would suggest inflammatory stenosis, whereas a grey or brown stinking, rancid, turbid fluid, depositing a grey or brown granular debris, and surmounted by a layer of froth, would be significant of cancer. Any brown granular detritus, superficially suggestive of "rotten grounds," should be tested for blood pigment by solidifying with acetic acid, extraction with ether, and the application of the guaiacum or benzidin tests.

The presence of slimy, ropy material, difficult to evacuate, is characteristic of chronic catarrhal gastritis, a condition commonly diagnosed, but not commonly seen. Small masses of mucus or muco-pus floating in the residual contents have been swallowed, and point to some naso-pharyngeal lesion.

1. *The Ewald Test-breakfast, or One-hour Meal.*—

This long-established test consists of one pint of freshly-infused tea without milk or sugar, and a roll of white bread, or preferably four breakfast biscuits. The meal should be taken deliberately, and the biscuits well masticated, or, if the teeth are defective, soaked in the tea and triturated with the tongue. Exactly one hour after the ingestion of the meal, a small pliable stomach-tube, free from cracks, and of the velvet-eye type, well wetted with warm water, is passed to the fundus, as indicated by a mark on the tube, and as much as possible of the stomach contents is withdrawn, either by an evacuating bottle or by siphonage, and the amount measured. A small amount, 30 c. cm. or less, will indicate rapid emptying of the stomach, as in certain cases of duodenal ulcer and other forms of reflex dyspepsia, and in achylia. A large amount, on the other hand, will point to delayed emptying, either from pyloric stenosis or spasm. The normal amount which can generally be withdrawn is from 50 c. cm. to 70 c. cm. The material is then filtered. the presence of

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bile, as shown by the characteristic colour, and of blood, is noted. In the filtrate the presence or absence of free HCl is determined either by a drop of Topfer's reagent (an alcoholic solution of dimethylamidoazobenzol), a yellow solution which turns cerise by free mineral acids, or by Gunzberg's test (phloroglucin-vanillin). The acid values—namely, the free HCl and the total acidity—are estimated by titration with $\frac{N}{10}$ caustic soda, Topfer's reagent and phenolphthalein respectively being the indicators. These values vary within relatively wide limits in the normal stomach, namely free HCl, 20 to 40; total acidity, 40 to 60. The figures are the amount of $\frac{N}{10}$ caustic soda in c cms required to neutralize the free HCl, and the total acidity respectively in 100 c cm of stomach contents. A considerable experience has shown that the diagnostic utility of the Ewald test-breakfast is limited, but that the results may be highly suggestive.

Considerable variations occur in the acid values in the same individual due to variations in secretion of nervous origin, and in an investigation made some years ago I endeavoured to eliminate this as far as possible by taking the average of three consecutive daily observations.

The results then obtained showed that the highest acid values occurred in cases of juxta-pyloric ulcers, the free HCl value ranging from 60 to 95, the latter figure occurring in a case of duodenal ulcer with rapid emptying, in reflex dyspepsias of appendicular and uterine (fibroids) origin free acid values of from 40 to 60 are the rule, whilst in reflex gall-bladder dyspepsia the free acid values are generally within normal limits. Similarly, in chronic ulcer on the lesser curvature in the body of the stomach the acid values are within the normal limits, which would indicate that the ulcer *per se* is not responsible for the high acid values found when it is juxta-pyloric in position. In cancer of the

body of the stomach disappearance of free HCl from the stomach contents is an early and important phenomenon, and when this is associated with the presence of blood, and maybe, of lactic acid, as shown by Uffelmann's reagent, it is of profound diagnostic significance. In pyloric cancer, on the other hand, free HCl may be detected ranging up to ten in the earlier phases of the disease.

In pernicious anæmia free HCl is commonly absent, the total acidity being low, and occasionally one meets with an apparently normal individual with a similar achlorhydria.

An absence of free HCl with an excess of mucus is met with in some cases of catarrhal gastritis; but it is the excess of mucus that is significant.

2. *The Fractional Test-meal of Rehfuß.*—Since 1914 this has been the most generally employed method for investigating gastric disorders, and while the results obtained have elucidated in many ways the physiological mechanism of the variations in the composition of the gastric contents in pathological conditions, the actual diagnostic importance of variations in the acid values of the stomach contents remains much the same.

A Rehfuß tube, or some modification of it as that devised by Ryle, is passed into the fasting stomach, and the residual, or resting, contents are sucked out by a Record, or similar, syringe attached to the free end of the tube, and then, the tube remaining *in situ*, a pint of warm gruel is swallowed by the patient, the gruel being made by boiling two tablespoonfuls of fine oatmeal in a quart of water until the bulk has been reduced to one pint, and strained through muslin. Salt should not be added. After fifteen minutes 10 c.cm. of the stomach contents are withdrawn by the syringe, and placed in the first of a series of numbered test-tubes, and a similar quantity is withdrawn at fifteen-minute intervals until the stomach has been

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evacuated, the several samples being kept in proper sequence in the numbered tubes.

The examination of the residual, or resting, stomach contents and its significance has already been dealt with.

In each of the sequence of samples of test-meal withdrawn from the stomach, the presence, or absence, of starch is determined by the addition of iodine, of bile by its characteristic colour, and of blood similarly, and of mucus by its tenacity. In each the values of the free HCl and total acidity are estimated as before. The results are then plotted on a squared chart, and give a characteristic curve, the features of which are. the acid value increase in each sample until a maximum is attained in $1\frac{1}{4}$ hours and then abruptly fall in each further sample until the stomach is empty, the fall being marked by the appearance of bile in the samples. The disappearance of starch marks the time at which the food has left the stomach, and is a measure of the rate of emptying.

The acidity curve which varies in the normal stomach within fairly wide limits is not a curve of gastric secretion, but is more nearly a representation of the motor mechanisms of the stomach.

The rising acidity is the result of the continuous addition of gastric juice having a constant acidity of 0.42 per cent to a stomach contents which is continually diminishing in volume by passing into the duodenum, the fall in acidity marks a new factor, namely, the reflux of alkaline duodenal contents into the stomach, and the secretion of an alkaline fluid by the pyloric mucosa which neutralize the acid, and this proceeds either continuously or with intermissions until the stomach is empty.

In certain cases of duodenal ulcer with rapid emptying of the stomach (duodenal hurry) the characteristic curve shows a steep rise to an abnormally high acid

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responsible for a small fraction of the total nitrogen of the blood. This fraction is generally referred to as "non-protein nitrogen." Now, when there is a difficulty in excreting these bodies, their concentration in the blood tends to increase. Each individual body can be estimated, and its concentration in the blood determined, but it is more convenient in practice to estimate the urea only, or to estimate the nitrogen of the whole group together. The amount of urea present acts, in a general way, as an indication of the concentration of the other bodies; if the amount of urea is high the other bodies are also high. The estimation of blood urea is, therefore, usually carried out in the examination of renal patients, and much importance is generally attached to the concentration of this substance as an index of renal inefficiency. The blood urea alone, however, cannot always be relied upon to furnish reliable information as to the state of the renal function, and far too much importance is often attached to it. When the circumstances permit of this estimation being accurately carried out, the result obtained will often prove useful, but experience is necessary in its interpretation, and wrong conclusions are sometimes drawn. This depends on the fact that an increase of blood urea is not necessarily an indication of renal deficiency. Many extra-renal conditions, such as cardiac disease, excessive diarrhoea, gastro-intestinal derangements, deep-seated abscesses and metabolic disturbances of various kinds may increase the blood urea. A high blood urea is, therefore, *per se* not a necessary indication of defective kidneys.

The mechanism by which the kidney excretes urea is at present unknown, but the renal cells possess to a very extraordinary degree the power of concentrating urea from the blood into the urine. The blood of a normal healthy subject contains, say, 25 milligrams of urea per 100 c.cm., and from this dilute solution the

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kidney forms urine which may contain up to 2,000 milligrams per 100 c.cm., or even more. Thus the normal kidney concentrates urea from seventy to a hundred times. In nephritis this function is materially disturbed, so that in severe renal lesions the factor may amount to 2 or less. In such cases the amount of urea in urine is only twice that in the blood. This so-called *urea concentration factor* provides valuable information as to the state of the renal function.

When a formerly healthy kidney begins to fail a point soon arrives at which some difficulty is experienced in excreting the necessary amount of urea and other waste products. To overcome this difficulty an increase in the "head" of these bodies in the blood takes place. Thus the blood urea which was normally 20 milligrams per 100 c.cm. rises to, say, 30 milligrams per 100 c.cm. With this increased "head" in the blood the kidneys are able to excrete as much urea per day as they did before when the blood urea was only 20 milligrams. As the disease progresses a larger and larger "head" of blood urea is necessary, but during the whole time of this gradual increase in blood urea the total excretion of urea in the twenty-four hours remains the same. When the destruction of renal substance reaches a point at which even a very high blood urea "head" does not result in the excretion of the usual daily amount of urea, this product accumulates rapidly in the body, and death soon takes place. There is no increase in blood urea until about three-fourths of the normal kidney substance is rendered functionless; it is, therefore, obvious that any information derived from blood urea estimation is confined to comparatively advanced cases of renal disease. Early lesions show no change whatever in blood urea or other nitrogenous waste products.

The Urine in Nephritis—It is a commonplace that albuminuria accompanies nephritis, but it is not so

well recognized that severe and progressive renal disease may be present without any protein appearing in the urine. In a group of more or less severe renal cases investigated by me some time ago, 5 per cent. showed no albuminuria, and yet in several of these the renal condition was practically hopeless.

Albuminuria may, or may not, indicate the presence of kidney disease. It is present in about 3 to 5 per cent. of normal healthy adults. Not uncommonly a patient who has had acute renal disease many years before may still pass protein in the urine, and yet show no evidence whatever of any renal inadequacy. Generally the presence of albumin in the urine of a patient who had acute nephritis ten or fifteen years before would be taken as evidence of a chronic progressive lesion, but this is frequently quite a wrong conclusion. Many patients continue to pass albumin for very many years after an attack of acute nephritis, and yet functional tests prove that no evidence of nephritis is present. Such patients generally worry a great deal over their condition and think they have renal disease, when, on the contrary, their kidneys are functioning perfectly. Whether albuminuria following acute nephritis is or is not associated with progressive kidney disease can always be settled by the use of modern functional tests.

One of the most important effects of renal disease is to reduce the concentration of urea in the urine. The examination of isolated specimens of urine is frequently of little value, but it may be said with certainty that if any casual specimen contains 2 to 2.5 per cent. urea or over there is very little the matter with the kidneys. Often it is difficult to say clinically whether a patient's symptoms are uræmic or due to some other cause. A patient suffering from albuminuria may get an attack of influenza, and his symptoms may suggest uræmia to his medical attendant. Clinically it is frequently impossible to decide the matter, but simple

examination of the urine will often put the question beyond doubt. If the urine contains more than 2 per cent. urea the condition is quite certainly not uræmic. Various diseases, such as encephalitis lethargica, give rise to similar difficulties. Perhaps one of the most notorious mistakes is that not infrequently made in confusing the intestinal symptoms of uræmia with intestinal obstruction. Examination of the urine for albumin gives practically no help, for this substance may be present in both conditions. The important point in all such cases is to estimate the urea in a sample of urine. If the concentration is high the condition is not nephritis, and the difficulty is solved.

In some cases of suspected renal disease, blood examination must be undertaken, and urea may have to be given by mouth in order to test the power of the kidney to concentrate, but in very many instances the simple procedure of estimating the urea in an ordinary specimen of urine will supply all the necessary information.

The value of modern functional tests in estimating renal efficiency is no longer doubted by anyone who has had any experience of them. It is now certain that a definite assessment of kidney efficiency may be obtained in all cases when a careful examination of blood and urine on the above lines is carried out. In very severe cases the clinical symptoms are so obvious that modern tests are superfluous, but in less severe conditions these tests are essential in order to obtain information on which to base prognosis and treatment. Their value in genito-urinary surgery has been amply established, and deaths from uræmia, after prostatectomy, should now be incidents of the past. In passing, I might state that occasionally the results of these tests are apparently at variance with the general condition of the patient, the patient's condition may appear excellent, while the tests may give

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entirely unsatisfactory figures. In such cases experience proves, almost without exception, that the tests are more reliable as an index of the real renal condition than are the clinical symptoms and general condition. If this fact were more fully recognized in certain surgical procedures lives could sometimes be saved.

Though many of the functional tests employed are not very difficult to carry out, yet they demand a certain amount of manipulative skill. Estimation of the amount of urea in urine, however, is an extremely simple process which can be carried out by anyone in a few minutes. This simple procedure gives more information in general renal conditions than any other test at present employed. Instead of relying on albuminuria as an index of renal disease, the medical practitioner should get into the way of relying on urea concentration. It is not yet sufficiently recognized that the absence or presence of albuminuria affords but little evidence as to the condition of the kidneys. Many of our present views on the significance of albuminuria were formulated in days when kidney disease was not so well understood as it is now, and some of them are entirely erroneous. At least 50 per cent. of average individuals showing some albuminuria possess quite satisfactory kidneys. Again, the amount of albumin present is of little significance, except in acute disease, so that estimation of this product is usually superfluous. Further, it is very generally accepted that the particular kind of diet taken is not without influence in cases of albuminuria, and that the amount of albumin passed is decreased when protein is eliminated from the diet. This, however, is but another error founded on defective observation, no variation in diet protein produces any effect on the amount of albumin excreted in the urine

Skin Reactions in Asthma, etc.

By JOHN FREEMAN, M D

Director, Department of Clinical Bacteriology, St Mary's Hospital, etc

THERE is a group of illnesses which, for want of a better term, have been called protein idiopathies ¹

The following is a list of their manifestations: Asthma; Paroxysmal Rhinitis, such as Hay Fever; Animal Sensitiveness, such as Horse Asthma; Food Sensitiveness, such as Egg-Sickness; Urticaria, Eczema; Ichthyosis; Migraine-headaches, Epilepsy; Angio-neurotic Oedema; Paroxysmal Arthritis, Colitis, or Nephritis; etc ²

All these protein idiopathies are characterized by a peculiar and specific sensitiveness to one or more foreign proteins. The purpose of this article is to describe skin-reactions which may assist in the detection of this characteristic sensitiveness, and so of the disease produced thereby. However, in view of the reams of misleading literature produced on this subject, I want to make it quite clear to the practitioner that most of these protein sensitivenesses can *not* be tested for successfully, and many when detected are insignificant. Nevertheless, it is of great importance to understand the uses as well as the limitations of the method.

TECHNIQUE OF SKIN REACTIONS.

The generally employed method of skin-reaction is

¹ "Protein Idiopathies" see *Proc of Roy Soc of Med*, 1925, vol xviii, pp 29-32. Previously called "Toxic Idiopathies," see *Proc of Roy Soc of Med*, 1920, vol xiii, pp 129-148.

² This list might easily be lengthened. Also in addition to definite clinical entities, like hay fever, which are always protein idiopathies, it includes mere symptoms, like urticaria, which might be caused by, say, stinging nettles, or the blow of a whip.

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conducted as follows · For preference, test men on the flexor surface of the forearm, women and children on the extensor surface of the thigh, just above the knee. (If any cleaning of the skin is considered necessary, soap and water are preferable to an antiseptic.) With any sharp sterile instrument, e.g. a stiff hypodermic needle, scratch through the superficial dead layer of the skin till the red cutis vera is laid bare, but avoid drawing blood.

A series of small areas, two to three millimetres square, must be scratched in this way, the number being at least one more than the number of tests to be made. The different protein reagents are then brought into intimate contact with the cutis vera on the different sites, one site being left untouched as a control. If the reagent is a fluid, it is sufficient to drop it on the scratched area, if it is a dry solid, it may be rubbed into the scratches with any blunt instrument, e.g. the wrong end of a match, or dissolved in a slightly alkaline saline solution, and so dropped on to the scratch. If the protein is caught and dried on filter paper (a favourite method of mine) it may be stuck on to the scratched area with a drop of alkaline saline, after the manner of a child's "transfer" picture.

After the protein reagents have been in contact with the tissues for about five minutes, the scratched areas should be cleared up wherever necessary with swabs of wool and a little water, removing any blood, traces of reagents, paper, etc., which might obscure the reaction. This usually begins in about seven minutes with an erythematous blush, which surrounds the scratched area; following this an urticarial weal starting at the scratch, but spreading beyond it into the surrounding skin. If the reaction is strong, the urticarial weal may extend for an inch or more beyond the scratched area, sending out characteristic pseudopodia beyond even that. Usually, however,

SKIN REACTIONS IN ASTHMA

and with most types of protein, the urticaria is much less, and may not extend beyond the scratched area. The reaction is at its height in fifteen or twenty minutes, and is usually fading rapidly in half an hour. We take as a positive reaction either a *definite erythematous blush*, or a *definite urticarial weal*, or, better still, both of these together. Complete absence of any reaction (or a much slighter one) on the control site will prevent mistakes arising from dermatographia, etc. If the reagent is an unknown one, e.g. extemporized by the practitioner (see below), it should be tested on the skin of a normal man, to make sure that it is not a general irritant.

The following are accessory or confirmatory methods.

1. The *intradermal* 0.2 c cm of the reagent in fluid form (which must also be sterile) is injected into the thickness of the skin through a fine, sharp needle. This gives a *more marked erythema and urticaria* than is given by the dermal method, and so may be used in confirmation of a doubtful reaction. But if the patient is very sensitive to the reagent, he may easily receive a severe and widespread shock from the portions of the reagent which have joined the blood-stream via the lymph.

2. An *ophthalmic reaction* may be obtained by dropping the reagent into the conjunctival sac. This reaction also is more delicate than the dermal reaction, and quicker to come up (three to five minutes). But only one such reaction can be performed, since the other eye must be kept as the control. Also the patient may possibly be given an uncomfortably sore eye. A slight ophthalmic reaction is shown by a *tickling of the inner corner of the eye*, and a *reddening of the caruncle*. A stronger reaction will produce *sneezing, considerable irritation and reddening of the entire conjunctiva*.

3. *Reaction by proxy* may be carried out in the

preparations. There is one direction in which the "set of proteins" has the advantage. Groups of proteins from various sources can be mixed together into one reagent in order to test for a group of protein idiosyncrasies, e.g. scurf from the skin of all the common domestic animals; proteins from all the commoner meat substances; all the farinaceous foods, etc. But it will be found that it is seldom of any use to test completely at random in this way.

WHAT DOES A POSITIVE OR NEGATIVE SKIN REACTION MEAN ?

If *no* reaction is obtained, this may be because the person is not sensitive to that particular reagent, but there may be other explanations. The reagent may have been spoilt in preparation, or it may belong to a group of proteins which give only slight or very doubtful reactions, e.g. the bacteria, moulds, and fungi in general, as mentioned above.

If a *positive* reaction is obtained under suitable controls, then the patient is sensitive to that particular protein, but this sensitization may be quite, or comparatively, unimportant as the cause of his illness.

Even after a dozen positive reactions have been obtained, there may yet be other and more important sensitizations which have not been detected or suspected. For example, it is no good to tell a man that his persistent asthma, urticaria, etc., is caused by eating—to take random examples—bananas, tomatoes or lobster, when the man has suspected and persistently avoided such food for years. It is useless to ascribe a rhinorrhœa in mid-winter to hay fever, merely because the patient shows a positive dermal reaction to the pollen of the grasses.

Here the significance is merely that the patient is liable to random protein sensitivenesses, and the important ones may be not easily tested for, e.g. microbic.

Skin Reactions in Diphtheria, Scarlet Fever, and Tuberculosis.

By A. B. PORTEOUS, M.D., B.S., D.P.H.

*Assistant Clinical Bacteriologist, and Tuberculosis Officer, St. Mary's
Hospital, Hon. Bacteriologist, St. Marylebone General Dispensary*

SCHICK TEST.

IN 1907 Romer first used the intradermal reaction in guinea-pigs in carrying out virulence tests in diphtheria. This technique was supplemented by Michiels and Schick in 1913, who introduced the test known as the Schick Test, which has now been used clinically in many thousands of cases, in order to gauge in man the susceptibility or otherwise to diphtheria toxin.

It consists in inoculating into the skin of the subject a small measured dose of toxin, and observing what, if any, local reaction occurs. If no local reaction is produced, it is argued that the injected toxin has been neutralized by the patient's serum, and that the serum contains antitoxin, the amount of antitoxin being measurable by the amount of toxin injected.

The test is as follows :

The toxin is a six-day culture in sugar-free broth, filtered and allowed to stand 18 months to stabilize. The minimal lethal dose (m.l.d.) is estimated in the usual way. When required for the test a dilution is made so that one-fiftieth m.l.d. is contained in 0.2 c.cm. This diluted toxin must be used fresh, as it is not reliable after twenty-four hours. A part of the diluted toxin is heated to 70° C. for five minutes, and is used as a control. In the test, 0.2 c.cm. is injected very

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carefully intradermally, using an inoculation syringe with a fine needle. The best site is the flexor aspect of the forearm. A small white wheal will arise showing pits caused by hair follicles and sweat glands. The control test is carried out on the corresponding spot on the other arm. A second syringe is used for this, and 0.2 c.cm. of the heated toxin is injected here.

Four types of reaction are obtained :

(1) *Negative*.—Both arms show after twenty-four hours nothing except a spot where the needle was inserted, or perhaps a small pink coloration, which soon fades.

(2) *Positive*.—The control arm is as in (1), but on the test arm, after twenty-four to thirty-six hours, a red flush begins to appear. It is half to one inch in diameter, and is at its maximum in four days, gradually fading into a brown discoloration on which small scales may appear. Pigmentation may remain for weeks. Occasionally the positive reaction does not appear until the third day.

(3) *Negative and Pseudo-Reaction*.—This is a red flush with dark centre, less circumscribed than the positive reaction. It develops rapidly in twenty-four hours, and is equal on both arms. It has mostly faded by the fourth day, and may leave behind pigmentation with a certain amount of desquamation.

(4) *Positive and Pseudo-Reaction (combined)*.—The pseudo effect develops a red flush with deeper centre on both arms, and as this fades the positive emerges on the test arm as a much larger flush with a dark centre, which goes on to pigmentation and desquamation. The control reaction has meanwhile faded. The readings are most distinctive between the fourth and seventh days. The combined reaction is comparatively uncommon.

The patient is *Immune* if the reaction is Negative or

SKIN REACTIONS

Negative and Pseudo.

The patient is *Susceptible* if the reaction is Positive or Combined.

Michiels and Schick estimated that after inoculation of their standard quantity of toxin (one-fiftieth m.l.d. in the test), that to give a negative reaction at least one-thirtieth unit of antitoxin per c.cm was present. Much more antitoxin was often found even up to ten units. Later work shows that, as ordinarily carried out, Schick's Test reveals the presence of about one-fortieth to one-sixtieth unit of antitoxin per c cm, and a negative case is assumed to have at least this amount to be immune.

The pseudo element in these reactions is not yet explained—suffice it to say that it is thought by some to be an "allergic reaction" owing to a previous sensitization to bacillary proteins in the toxin. It is inseparable from the toxin moiety even by fractional distillation and precipitation continued until 99 per cent of the nitrogen present has been got rid of. It does not occur in animals.

TABLE I
The Schick Test at Different Age Groups (Parl.)

Age						Schick Positive Per cent
0- 3 months	-	-	-	-	-	15
3- 6 "	-	-	-	-	-	30
6-12 "	-	-	-	-	-	60
1- 2 years	-	-	-	-	-	70
2- 3 "	-	-	-	-	-	60
3- 5 "	-	-	-	-	-	40
5-10 "	-	-	-	-	-	30
10-20 "	-	-	-	-	-	20
Over 20 "	-	-	-	-	-	15

As regards susceptibility to diphtheria amongst children, it may be stated broadly that there is a certain passively transmitted immunity in infants under one year, due to inheritance of antitoxin from the mother, between two and five years there is a distinct loss of immunity, which increases again in children of school

carefully intradermally, using an inoculation syringe with a fine needle. The best site is the flexor aspect of the forearm. A small white wheal will arise showing pits caused by hair follicles and sweat glands. The control test is carried out on the corresponding spot on the other arm. A second syringe is used for this, and 0.2 c.cm. of the heated toxin is injected here.

Four types of reaction are obtained :

(1) *Negative*.—Both arms show after twenty-four hours nothing except a spot where the needle was inserted, or perhaps a small pink coloration, which soon fades.

(2) *Positive*.—The control arm is as in (1), but on the test arm, after twenty-four to thirty-six hours, a red flush begins to appear. It is half to one inch in diameter, and is at its maximum in four days, gradually fading into a brown discoloration on which small scales may appear. Pigmentation may remain for weeks. Occasionally the positive reaction does not appear until the third day.

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The patient is *Immune* if the reaction is Negative or

SKIN REACTIONS

are found to be Schick negative. Further, where no natural immunity exists already as in the better class school-children, the "primary response" to inoculation is slow and feeble, whereas a similar dose will elicit a rapid and abundant production of antitoxin in those children who have already some antitoxin in their blood, even a minute amount ("secondary response").

Another application of the Schick Test is in the clinical diagnosis of diphtheria. A true case of diphtheria will have a positive Schick reaction. A carrier of virulent diphtheria bacilli will have a negative reaction.

DICK TEST.

This test is used to demonstrate susceptibility or otherwise to the toxin of scarlet fever in the same way as the Schick Test in diphtheria.

Briefly the theory is that scarlet fever is caused by the circulation in the blood of the toxin of a specific hæmolytic streptococcus. The microbe does not invade the blood-stream, but remains in the pharynx, or wound, or elsewhere, as in the case of diphtheria. The toxin causes the development of an antitoxin, and this is demonstrable in the serum of convalescents. Immunity is developed to this toxin, but not to the bacteria themselves, hence the occurrence of mastoiditis, abscesses, and other streptococcal manifestations as sequelæ of scarlet fever, even though the patient has recovered from the scarlatinal toxæmia.

The rash and fever are due to the toxin, and injection of the sterilized toxin will produce these symptoms in man, but will fail to produce them where antitoxic immunity has previously been produced by the disease.

The earliest work on this subject was reported by Moser in 1902. He isolated streptococci from the throats of scarlet-fever cases, and injected horses with

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these living organisms together with the broth they were grown in. He thus obtained a curative serum and reported good results.

Savchenko in 1905 obtained a strong toxin from the filtered broth, and also a serum with both antitoxic and streptococcal bactericidal properties.

Gabritschewsky in 1907 vaccinated children successfully with a vaccine containing the toxin and bodies of streptococci obtained from scarlet fever.

The work of the Dicks, Dochez, Mervyn Gordon, etc. in the last two or three years has led us to appreciate this early work at its true value, which hitherto had gone almost unrecognized.

In October 1923 the Dicks first inoculated five volunteers with a streptococcus culture from a case of scarlet fever. One of them developed the disease. At the same time the throats of five others were inoculated with the filtrate of a broth culture. No disease developed. These five were then treated with the streptococcus culture, and one of them developed the disease. This showed that the active agent was not a filtrable virus attached to the microbes. The Dicks next worked at the toxin already discovered by Savchenko and Gabritschewsky, and the Dick Test was the result.

Dick Test.—The toxin is used in a dilution of 1 in 1,000, and is standardized by intracutaneous tests in a susceptible human being, as it has little effect on animals

0.1 or 0.2 c.cm. of the dilution is injected intracutaneously, the technique being the same as in the Schick Test. The control is the same dilution of toxin heated for one hour in a water bath at 100° C, and this is injected into the other arm.

The reactions which result are much the same as in the Schick Test, including the occurrence of a pseudo-reaction. The positive flush appears much earlier than

SKIN REACTIONS

in the Schick Test, being at its maximum in twenty-four hours, and fading after forty-eight hours.

It is possible by methods described by Huntoon to separate most of the protein constituents from the toxin, so that fewer pseudo-reactions result in the Dick Test. The toxin is not a globulin but comes down with the higher albumin fraction and is digested by trypsin. As in the case of diphtheria, a toxoid is being prepared similar to that reported by Glennie and Hopkins.

Zingher has reported on 7,700 healthy persons of all ages tested by this test. There is a close similarity to the Schick Test in the percentage of positive reactions in the various age groups.

TABLE II
The Dick Test at Different Age Groups (Zingher).

Age	Total Tested	Positive Per cent
0- 6 months	29	41.8
6-12 "	52	65.3
1- 2 years	233	71.6
2- 3 "	201	61.2
3- 4 "	241	60.5
4- 5 "	261	48.4
5-10 "	1,935	33.6
10-15 "	2,065	22.8
15-20 "	981	16.8
20 years up	776	14.4
Total	7,700	29.2

Infants under a year old show a much higher proportion of negative reactions than those between one and two years, presumably on account of transmitted antitoxin from the mothers. Zingher obtained antitoxin from the umbilical cords in four cases where mother and child were both negative. In two cases where no antitoxin was obtained, both mother and child were Dick positive.

In the lower-class schools about three times as many were Dick negative as in the higher-class schools.

The Dick Test is positive in patients suffering from the disease, for the first three days; it then gradually

significance was attached to those results which gave more than a certain numerical "sensitiveness value." Other methods using dilutions of T. and also P.T.O. (bovine), in strengths from 0.1 to 100 per cent., have been claimed as reliable by their authors.

It may be said, however, that no reliable differences between human and bovine tuberculosis can be elicited by these tests (Gauvain), and also that a really satisfactory quanti-cutaneous method for the diagnosis of active tuberculosis as opposed to latent tuberculous disease is yet to find. A negative result is of value. Von Pirquet concluded, as a result of his clinical and autopsy experience, that a positive cutaneous reaction in a child under two years old points to the existence of an active process, as latent foci are rare at that age. He recommends the test for the diagnosis of tuberculosis in early life.

The relation of the tuberculin reaction to the specific inflammation of animals immunized against foreign protein is not wholly clear. It is probable that the tuberculin reaction is referable to an antibody present in the tuberculous animal (Opie). In support of this several observers have claimed that animals may be rendered sensitive to tuberculin by injection of the serum of tuberculous animals, but others have failed to bring about this passive transfer of hypersusceptibility.

Sera from patients tolerant to large doses of tuberculin possess the power of neutralizing tuberculin in certain dilutions.

As now performed, the test should be regarded as additional evidence to be taken with clinical signs, history, etc.

The following fallacies must be borne in mind :

(1) The reaction tends to disappear in advanced cases and in rapid military tuberculosis.

(2) It is absent in measles for the first ten days, and in certain other acute conditions.

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APPOINTMENTS.

No charge is made for the insertion of these notices the necessary details should be sent before the 14th of each month to The Editor, THE PRACTITIONER, Howard Street, Strand, London, W C 2, to secure inclusion

ANDERSON, W W, M B Edin, appointed Certifying Factory Surgeon for the Whitchurch District, co Salop

BELL, P S, MRCS, LRCP, appointed House Physician to Westminster Hospital

BLAIR, D, M D Glasg, appointed Super Intendent of Prestwich County Mental Hospital by the Lancashire Asylums Board

COHEN, Henry, M D Liverp, appointed Lecturer in Practical Therapeutics in the University of Liverpool

COYTE, Ralph, M B, B S Lond, FRCS appointed Assistant Surgeon to the Queen's Hospital for Children, Hackney Road, E 2

DANIEL, S M, MRCS, LRCP, appointed Resident Obstetric Assistant to Westminster Hospital

DAVIES, J, MRCS, LRCP, appointed House Surgeon to Westminster Hospital

GALLOWAY, R L, M B, FRCS Edin, appointed Assistant Surgeon North Middlesex Hospital, Edmonton

GRANT Ian M, M D Edin, appointed Medical Superintendent, Glasgow Royal Infirmary, vice J M Thom, O B E, M B, C M Edin retired

GRAY, J S McLean, appointed Assistant Tuberculosis Officer and Assistant Medical Officer of Health for Renfrew

HUTT, C W, M D Camb DPH Oxf, appointed Lecturer in Hygiene and Public Health Charing Cross Hospital Medical School

JONES, D MRCS, LRCP, appointed House Physician to Westminster Hospital

LINDBERG, E W, M B, Ch B Glasg, appointed Certifying Surgeon under the Factory and Workshop Acts for the Frickelheim District of the County of Dorset

McCOULL, R, LRCS & S Edin, appointed Certifying Surgeon under the Factory and Workshop Acts for the Wylam District, County Northumberland

McFADZEAN, M B, Ch B Glas, appointed Assistant Medical Officer London County Mental Hospital Colney Hatch

McFARLAND, Bryan, M B, Ch B Liverp, appointed Assistant Orthopaedic Surgeon, Royal Liverpool Children's Hospital

McKENDRICK, W, M D, DPH Glas, appointed Medical Officer of Health for Colwyn Bay and Assistant Medical Officer of Health for Denbighshire.

MASTERMAN, L Margaret T, M B, B S Lond, appointed Assistant Medical Officer, Selly Oak Hospital, Birmingham

MILLER, H, M B, B Ch Glas, appointed Medical Referee under the Workmen's Compensation Act (Additional) for the Sheriffdom of Lanark

ODGERS, P N B, B M, M Ch Oxf, appointed Demonstrator in the Department of Anatomy University of Oxford

POLLARD, J M W, M D Lond, appointed Senior Medical Officer, West African Medical Staff, Assistant Director of the Medical Service in Nigeria, in succession to Dr B Molser, retired

PUGMIRE, Gertrude E, MRCS, LRCP Lond, appointed Surgeon, North Dispensary, Vauxhall Road, Liverpool

RUBRA, E J, MRCS, LRCP, appointed House Surgeon to Westminster Hospital

SANDS, Margaret, M B, Ch B Edin, D P H Lond, appointed Assistant Medical Officer of Health and Assistant School Medical Officer at Lancaster

STOCKMAN, R, M D Edin, appointed Medical Referee under the Workmen's Compensation Act (Additional) for the Sheriffdom of Lanark.

SYMONS, A D, M D, B Ch Bristol, appointed Certifying Surgeon under the Factory and Workshop Acts for the district of Shrewsbury

TIBBLES, S G, LRCP, LRCS Edin, LRFP S Glasg, appointed Honorary Oculist to the Actors' Association and the Actors' Benevolent Fund

WALKER, E W Ainley, M D, B Ch, D Sc Oxf, appointed Lecturer in Pathology in the University of Oxford for a further period of five years

WATT Alexander Wilson, M B, Ch B Glasg, appointed Junior Assistant Medical Officer at the Carlisle Mental Hospital

WEBB, J Curtis M B, B Ch, MRCS LRCP, appointed Consulting Radiologist and Electrologist to the Children's Hospital, Cheltenham

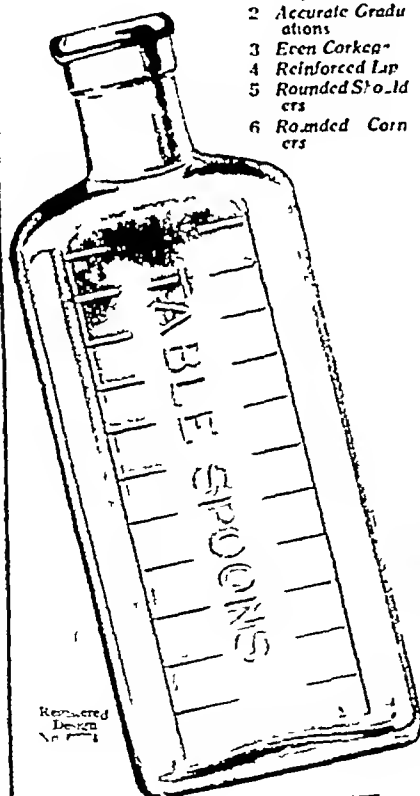
WILLIAMS, J W, MRCS, LRCP Lond, appointed Medical Officer of the Penarth District of the Cardiff Union

YULE, John, M B, Ch B Glas, appointed Assistant School Medical Officer, Hull Education Authority

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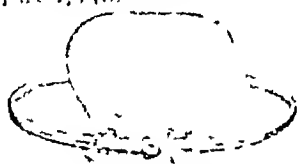
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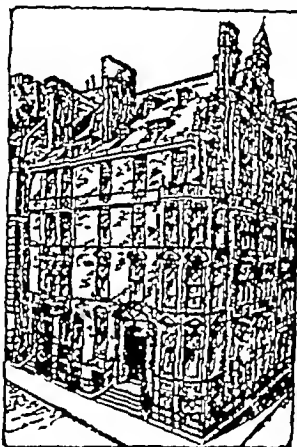
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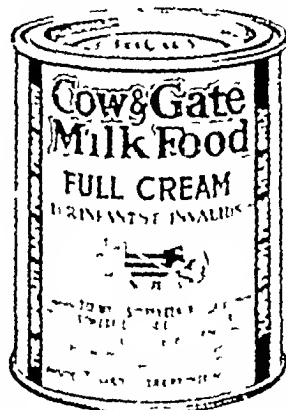
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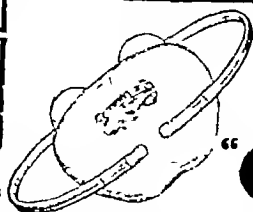
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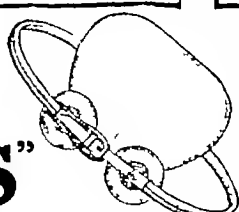
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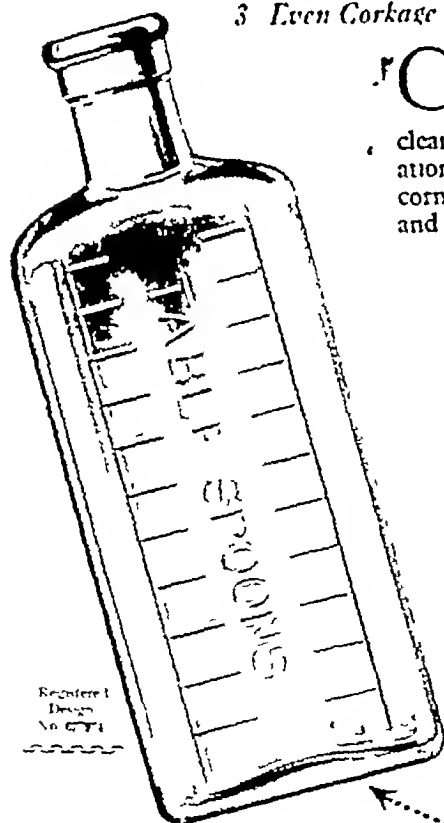
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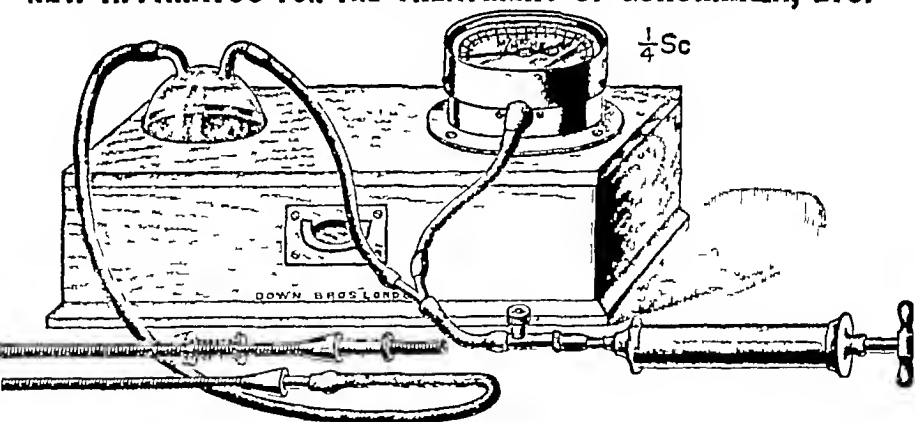
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are scientific preparations which an always increasing number of Medical Practitioners describe as the most dependable therapeutical agents for providing nutrition for nerve-cells, quickening metabolism and combating functional nervous disturbances in their experience

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As a result of extensive researches on the bacteriology of the respiratory tract, some ten new species of bacteria have been discovered in cases of bronchial and nasal catarrh. These new organisms have now been included in our new Detoxicated Anti Coryza Vaccine which now has the following composition:—

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<i>B. sepius</i> (coryza signetosum)	5 000
Staphylococci	5 000
Hæmolytic streptococci	5 000
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Total	50 000 millions per c.c.

This new Detoxicated Anti Coryza Vaccine is indicated for the prevention of colds in susceptible persons, also for the treatment of coryza, bronchitis, nasal catarrh, recurrent colds, hay fever, etc.

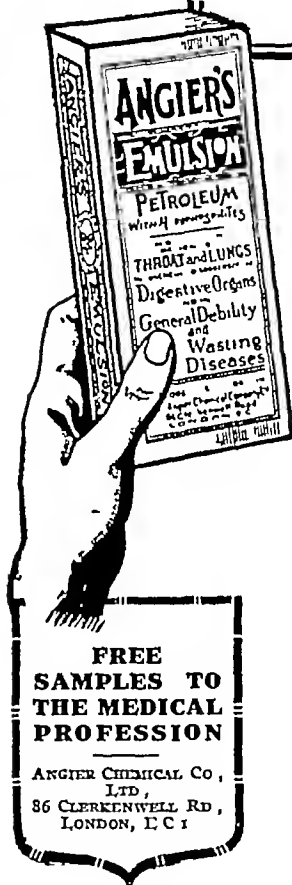
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C—PROTARGOL AND ICHTHYOL (each 2%)

Glycerin and Boro-Glyceride base, 50%

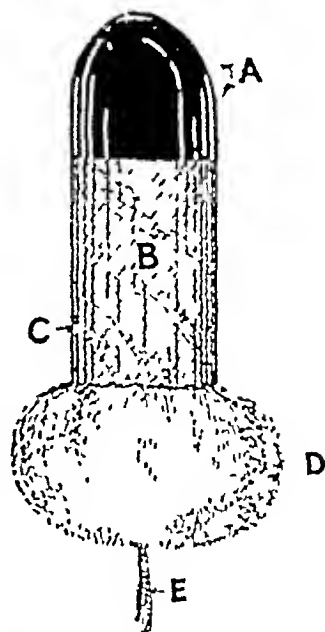
D—OPIUM BELLADONNA, AND HYOSCYAMUS

Glycerin and Boro-Glyceride Base 50%
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See "A"



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Our stock medications are always reliable as a stand by but Pontampons lend themselves to a variety of uses and the medication can be adapted to suit the requirements of any given case.

SAMPLES will be sent to any physician who will make application to

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WINCARNIS contains no drugs and can therefore be prescribed with perfect safety, while the most scrupulous care is exercised to maintain its standardization, so that the dosage can be regulated precisely

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"The Wine of Life."

Prepared solely by Coleman & Company, Ltd., Wincarnis Works, Norwich

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An invaluable stimulating expectorant, indicated in all cases of bronchial catarrh. Since it contains no opiates, it can be used in the persistent and prolonged treatment of severe and chronic cases.

A doctor writes: "I have been using Malto-Yerbine extensively for some considerable time. It appears to be borne by the stomach at all times—before, during or after food—a superiority over most cough remedies—and to be effective in facilitating expectoration."

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WITH

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A perfect emulsion, containing 30% pure Norwegian Cod-Liver Oil. Perfectly palatable, easy of administration, readily assimilated and of great therapeutic value.

Maltine

A malt extract of high diastatic power, containing the concentrated elements of malted barley, wheat and oats.

An ideal nutrient digestive food, of great value in phthisis and other tubercular conditions.

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*If you have not received our new publication
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or have mislaid your copy we shall be glad
of the opportunity of sending you another*

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SOME REFLECTIONS ON PURGATION

THE recent experiments of Dr. Alvarez and Friedländer show us how much less simple is the process of intestinal peristalsis than has been commonly supposed. Not only are food residues normally retained within the colon for a much longer time than is customarily assumed, but, as Elliot and Barclay Smith pointed out so long ago as 1901, antiperistalsis and segmentation play a part in the ascending colon almost as large a part in its muscular activity as progressive peristalsis itself.

In these facts is much food for reflection. They help to explain some of the ill effects which follow the habitual or repeated use of strong purgatives. There are undoubtedly occasions when it is desirable to bring about a speedy and complete evacuation of the colon, but this is a proceeding which should usually only be carried out on the orders of a medical man familiar with the pathological circumstances. Rare indeed are the conditions in which this thorough 'clear out' should be frequently repeated. Every effort should be made to dissuade the lay public from themselves resorting to the use, especially the habitual use of cathartics and other drastic aperient drug.

It is claimed that none of these objections apply to the effervescent preparation known as ENO's 'Fruit Salt'. This contains no mineral aperient such as the sulphates of magnesium and sodium but is essentially a combination of alkalis with fruit acids. It is entirely free from sugar and added flavouring matter, its well known agreeableness to the palate being solely due to its purity and the care with which its experimentally determined uniform physical texture is maintained. Taken when needed in the doses advised ENO does no more than make effective that regular gentle painless elimination the absence of which is so general an experience among us civilised folk.

"THE PROPRIETORS OF ENO'S 'FRUIT SALT' WILL deem it a privilege to send to any member of the Medical Profession, for his personal use, a bottle (Hardy or Household size as desired) of their preparation, with a copy of

"THE DOCTOR'S
POCKET REMEMBRANCE"

This summarises briefly a few points in the diagnosis of nervous diseases which often slip the memory. Bound in black morocco limp.



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In the treatment of coughs, Heroin is preferable to morphine

BECAUSE



- 1 It exerts a similar sedative action but lessens the frequency of respiration, this, however, is more than compensated for by its greater depth.
- 2 It is palatable and its soothing effect is practically instantaneous.
3. It is active in smaller doses than is the case with morphine.
- 4 It is less depressant
- 5 It does not cause constipation
- 6 It affects the respiratory more than the cerebral functions.

Clinical Sample and Literature on request

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of

Hyperchlorhydria and Associated Conditions

TRADE
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ALOCOL

BRAND

Colloidal Hydroxide of Aluminium

Modern medical experience has proven that while the usual alkalis and oxides possess power for neutralizing the normal or abnormal acids of the stomach their action is only symptomatic and transitory. They may give momentary relief to the painful condition, but they also have the effect of aggravating the morbid condition. For this reason they are distinctly contra indicated, especially in stubborn cases.

"Alocol" does not neutralize acid, it absorbs the excess colloido-chemically and at the same time leaves a sufficiency for normal gastric digestion. The outstanding advantage of "Alocol" as an antacid is that it removes from the system the causative acid radicle (Cl), instead of merely temporarily neutralizing it. "Alocol" can be used for prolonged periods without the slightest harmful effect.

"Alocol" is indicated in all conditions in which diagnosis reveals high gastric acidity. It is particularly valuable in the treatment of chronic affections of the stomach, the dyspepsias, especially those of pregnancy, gastric and duodenal ulcer, gastrosuccorhea and in conditions characterized by gastralgia, pyrosis, flatulence, acid eructation and other symptoms common to gastric disease.

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PROTEOLYTIC FLUID

A powerful polydigestive, consisting of the proteolytic gastro-intestinal enzymes:

**PEPSIN—TRYPSIN
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This product is an exact preparation, and is the outcome of definite results of a numerous series of experiments on the digestive enzymes, individually and collectively

The enzymes are combined in a non-antagonistic serum, each enzyme retaining its full activity and independent function

PROTEOLYTIC FLUID is indicated in all atonic and morbid conditions which produce deficient Proteolytic activity Its flavour is agreeable and piquant and suits the most delicate and fastidious palate

Dose —20 to 60 minims in water,
half an hour before meals

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THE name "Adrenalin" is linked inseparably with the good name of Parke, Davis & Co. What they have learned in the twenty-six years of experience in the manufacture and standardisation of this important product since they introduced it into Medicine (in 1900) makes their label an assurance that Adrenalin, P. D & Co., the original Adrenalin, has no superior.

To ensure the use of the original and well-tried preparation, *which is a natural, not a synthetic product*, medical men should distinctly specify "Adrenalin, P. D & Co." on prescriptions and orders. Every batch of this preparation is physiologically standardised.

In some respects, e.g. its wide range of indications, Adrenalin is the most remarkable endocrine product known.

Adrenalin is virtually instantaneous in action

Adrenalin blanches tissue as no other substance does

Adrenalin controls capillary bleeding

Adrenalin reinforces the action of local anaesthetics and creates a practically bloodless field

Adrenalin cuts short the paroxysms of asthma

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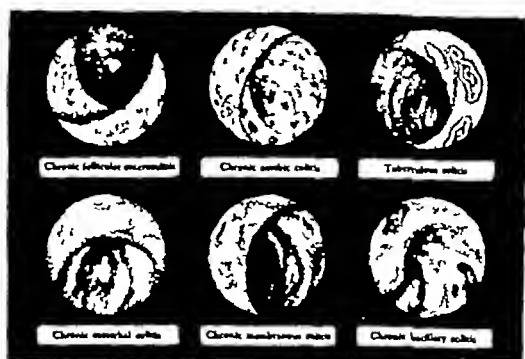
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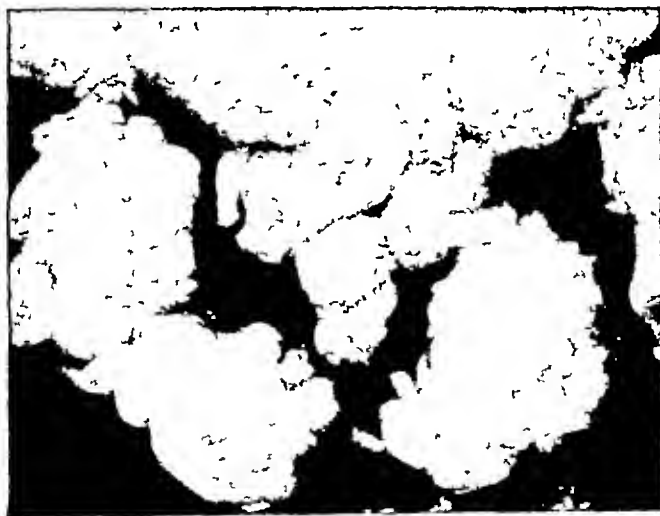
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The Amylopsin acts on the carbohydrate (Starch) of the Food and gradually changes it into soluble sugars (Dextrins and Maltose mainly, with a little Dextrose) more or less according to the length of time allowed for digestion.

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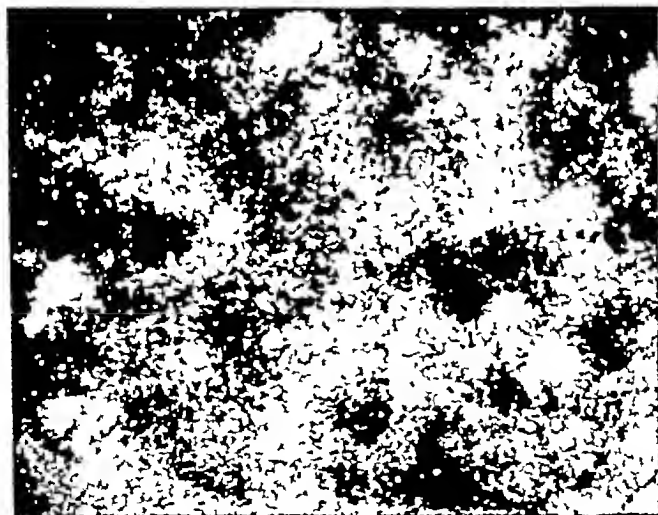
The Trypsin acts on the gluten of the flour and on the proteins (Casein, etc.) of the milk so that the curd is softened, and as a result it separates in the stomach in fine readily-digestible flocculi instead of large, often indigestible, curds. The extent of digestion can be varied, it is important to note that complete pre-digestion can never take place.

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The foregoing considerations show that Benger's Food is not merely a mechanical milk modifier - it is a real modifier of a peculiar character.

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AND WHICH HELPED TO MAINTAIN THE HEALTH AND VIGOUR OF
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"RYVITA" Crispbread is undoubtedly Sweden's greatest food gift to the world. Used constantly as the regular daily bread "it confers splendid health and vigour and helps to make such troubles as indigestion constipation malnutrition defective teeth etc unknown

From the Booklet of the "Ryvita" Company

THIS article being a small part only of a recent booklet published by the "Ryvita" Company contains a message of supreme interest and importance to all those intelligent people who know that the road to perfect health, vigour, and so joy in living lies in the discovery and use of perfect forms of food. It tells of a form of bread which, though still practically unheard of and unknown in this country, has for centuries formed the most important item in the regular daily diet of one of the hardest nations in Europe—the people of Sweden.

The Swedes are undoubtedly both mentally and physically, one of the hardest, healthiest races alive. Amongst them one finds at their very minimum such troubles as Indigestion, Constipation, Malnutrition and all their resultant broods of ills. This is largely due to their food wisdom, most of all to the splendid form, quality, and high nutritive value of that regular Staff of Life

as we know and eat—and above all, white bread—is practically unused and unknown. They know too much about true food value to waste their money in buying and their stomachs in working on, such system-clogging useless stuff. Their Swedish "Crispbread" is a complete cereal food, not only because of its perfectly balanced food elements but also because mechanically, its natural fibrous form is an actual aid to the operation of those functional processes by which all the food we eat must be digested and assimilated (and its waste evacuated) if we are to get any good from it in the form of life energy, warmth, and growth i.e. good health.

It is doubtless due to the fact of being made, as it is of natural pure crushed rye grain and baked under perfectly hygienic conditions, that Swedish Rye Crispbread i.e. "RYVITA" possesses that fine flavour and impression of perfect purity which anyone who has had the privilege of eating it is never likely to forget.

THEIR DAILY BREAD

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RYVITA ' CRISP-BREAD—Continued

defective teeth. By merely eating 'RYVITA' regularly one gets a better teeth-cleaning than is possible from any tooth-brush. Moreover, because of its richness in the natural organic salts of iron, phosphorus and lime 'RYVITA' is a bone builder and so a tooth builder. Regularly eating 'RYVITA' therefore helps to clean sound strong teeth.

'RYVITA' being made of crushed whole-grain rye contains the proper natural proportion of bran in fact all the vital elements that Nature herself so lavishly packs in grain but which man so often wickedly spoils in the way he treats or refines "it." 'RYVITA' "Crispbread" is 'dry' or 'Crisp' biscuit like bread that is, instead of being cloggy and mushy like ordinary soft bread it is crisp and friable to the bite of the teeth—a delightful 'scrunchy' sensation in itself right from the first bite and of the true clean and delicate flavour of the natural rye grain.

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'RYVITA' is already endorsed, prescribed and personally eaten by many of our leading medical men. Here is an extract from the booklet published by the 'Ryvita' Company—

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"Please send to my private address another 21 lbs of Ryvita as before. My people especially visitors seem to like it amazingly."

The superlative value of rye grain is recognized by pre eminent authorities e.g. Prof R H A Plimmer D.Sc. in the Government Official publication 'Analysis and Energy Values of Foods' shows that in Energy Value and other important points rye surpasses wheat.

Again in 'Vitamins—What we should eat and live' this great authority has the following—

The most serious loss of B vitamin from our foods is in the preparation of cereal in order to make them white for most grains have an abundance of B vitamin which is removed in the milling.

In some countries rye bread is largely used. Owing to a difference in the structure of rye grain the germ cannot be removed in the milling. Consequently rye bread is balanced by its

own B vitamin, and is much better than white wheaten bread. On comparing the three grains (wheat, oatmeal, and rye) in respect to vitamin content rye comes first, whole wheaten next, and then oatmeal."

Sir William Arbuthnot Lane in his foreword to the above book says—

"Bread which in its white state is wrongly regarded as the staff of life and forms the great bulk of the food of the poorer members of the community must be replaced by wholemeal bread or preferably by rye bread."

Dr Thos. J. Allen author of 'Scientific Food Preparation,' says—

"Rye is the queen of cereals, a perfect food in itself, more easily digested than any other cereal except rice to which it is superior in being a laxative, and an almost perfect balance—not a fat builder."

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- (c) That into the material the maximum and the bulimic of 'RYVITA' every good thing goes that is at present known and suitable to that end.

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Some Therapeutic Notes.

Rheumatism and its Allied Diseases Whatever views may be held as to the propriety of describing under this generic term a group of diseases varying so widely in etiology and pathology, there can be no doubt that it serves a useful purpose in bringing together a number of pathological conditions, all of which manifest at least one feature in common

In comparatively recent times, some success has been achieved in the treatment of certain members of the group by the help of the dentist, rhinologist, or other specialist, in locating and removing the foci of infection, but, unhappily, this radical treatment cannot be applied in the majority of cases where the causative factor—although strongly suspected—has not yet been definitely determined

No matter what the origin of the disease may be, one concrete fact, however, is generally present—disordered uric acid metabolism leading to excess of uric acid and its congeners in the blood and tissues, with their concomitant symptoms—and points the way to which treatment should be directed

Increased elimination of uric acid will obviously effect an amelioration in the patient's condition, but the establishment of a control over purin metabolism whereby the formation of this excess is prevented, will go a long way towards neutralizing the pathological process, and thus place the organism in a better condition to deal with the cause

It may be objected that there is no therapeutic agent which will bring about this result, an objection which is easily understood when it is remembered that all the older anti-rheumatic remedies—quite apart from their effectiveness or otherwise—usually had to be discontinued because of some associated ill-effect, which rendered their continued exhibition undesirable or impossible

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Within one or two hours of a dose taken per os, the uric acid excreted in the urine increases from 100 to 300% The permanency of the beneficial action thus effected is explained by its restraining influence on the formation of uric acid—a limitation of purin metabolism

The influence of Atophan in these diseases does not end here, since, by its analgesic action, it relieves the intense pain, while, by its powerful antiphlogistic properties, it arrests all inflammatory processes

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(So great was the demand for our last Special Number on Dietetics that we offer no apology for issuing another number on the same subject brought up-to-date. We do not propose to utilize valuable space by commenting on the individual articles, but will leave them to the considered judgment of the reader, being convinced that he will find a great deal of practical value which will help him in his duty to his patients, and assist in the making of a healthier population.)

THE PRACTITIONER

MARCH

1926

The Doctor and Dietetics: Some General Principles.

By SIR KENNETH GOADBY, K B E, L R C P, D P H

*Specialist Medical Referee for Industrial Poisoning, Home Office,
late Honorary Bacteriological Specialist, Royal Herbert Hospital,
Woolwich, etc*

THE literature of all civilized countries abounds with references to the advantages and disadvantages of food, of the choleric effects of beef and mustard, and the humours attributable to starchy articles of diet, but the present useful issue of THE PRACTITIONER dealing with foods and their advantages and disadvantages from many points of view may be aptly summed up in the plaintive wail of Katherine. "I care not what so long as it be wholesome food." Here is the crux of the matter: "What is wholesome food?" We know the old saying, "What is one man's food is another man's poison," and, again, the country advice, "Feed a cold and starve a fever," or Sydenham's philosophic epigram, "He that hath attained unto the age of forty abateth himself somewhat of his diet be he not a fool." As civilization has advanced and man has ceased to depend upon a

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the surface area. A fat person lying in bed will require less food than a thin person engaged in exercise. These, however, are extremes upon which dietists are agreed, what becomes difficult and a source of concern to the doctor is to advise a diet adequate in amount for a person who, whilst not suffering from a frank and declared disease, is yet in a condition of ill-health or a pre-disease state. To do so it is necessary to know whether the primary food constituents are improperly, partially, or inadequately utilized. In other words: Is the metabolism of the person it is sought to help normal on a normal diet? How far does the metabolism of protein carbohydrate fat—salts and water—depart from normal?

For purposes of illustration we may conveniently regard food which is assimilated as passing along the two arms of a Y. Along the one branch the food is turned into body growth, increase of body weight, and repair of tissue waste; along the second branch, into energy required by basal metabolism, or the internal energy of existence at rest and the output of external energy, of mental and physical activity.

The evaluation of the components of the first branch is difficult, but the estimation of the second series is approachable by direct chemical methods. To advise a choice of diet in the state of ill-health which precedes most forms of chronic disease, we require to know the nitrogen distribution in the blood and excretions, fortunately, the main quantity of nitrogenous refuse is discharged in the urine, only a very small amount in the fæces.

Fohn has shown that the nitrogenous metabolism of the body is very closely pictured in the nitrogenous excretion in the urine, and that whilst the urea nitrogen represents the assimilated food nitrogen (exogenous nitrogen), the creatinine nitrogen, and, to some extent, the uric acid nitrogen, represent the cell activity of

the body (endogenous nitrogen). The creatinine content of the urine remains remarkably constant under all sorts of variations in diet, whereas the urea nitrogen undergoes variations corresponding to the intake of proteid food. Great improvements have been made in the estimation of the non-proteid nitrogen of the blood, and it is now comparatively easy to make a quantitative analysis of the blood nitrogen, and correlate this with the nitrogen excretion in the urine. Failure of carbohydrate metabolism is too well known to be more than referred to in passing, but it is the correlation of the nitrogenous elements, and more especially the percentage nitrogen distribution of the waste products, that give a clue to the breakdown or early impairment of the nitrogenous metabolism of the body.

What is essential for clinical dietetics is not *how much* of the intake of nitrogen is excreted in the various forms of waste products, but rather what the *relative* proportions of the various nitrogenous end-products are to one another in the total nitrogen excreted over a given period, and how these quantities compare with a similar computation of the blood.

The nitrogen distribution in a normal person's excretions, with even a variable food supply, remains remarkably constant over long periods, and ultimately, either through disease or simple wear, one or other of the body functions commences to fail. If this impairment of function be detected in its earliest stages dietetic adjustments may be adopted with advantage, and commencing disease averted. After all, the principles involved are only a special case of those commonly employed in engineering, industrial chemistry, metallurgy, and many other industries. Why not apply them to medicine? The knowledge and the laboratory facilities exist—all that is required is real co-operation between those who work at the bedside and those who work in the laboratory.

Army Rations.

By SIR WILFRED BEVERIDGE, K B E , C B , D S O , M B ,
D P H

*Late Director of Hygiene, War Office, late Professor of Hygiene,
Royal Army Medical College, etc*

OWING to the varying conditions of a soldier's life and service in many parts of the world, in addition to the specialized nature of the work required of him, the provision of a universal diet to suit all his needs is obviously impossible. The soldier's dietary has to be considered and constructed, therefore, in accordance with those particular requirements, and so not one but many special rations have to be provided

Such diets or rations comprise the following: The normal peace ration; the field-service ration, which is further subdivided into the front-line ration, and that for the lines of communication, both varying materially with the exigency of a campaign; the standard emergency ration, one or more of which are carried by the soldier under active service conditions, and for use only in extreme necessity as may be decided by the general officer commanding, the haversack ration, which generally consists of bread and cheese, carried on field exercise; rations for rail or ship transport; and hospital dietaries. In an army in the field, in addition to these, special diets have to be arranged for native troops, women auxiliaries, labour companies, and prisoners of war, each according to their needs. Moreover, special rations are arranged for troops serving in tropical or arctic climates, both in peace and war.

Although the main principles applicable to all diets for communities are not departed from in the construction of a soldier's diet, yet the quantity and character of the food required especially depends upon

the amount and nature of the energy expenditure, the amount of body heat necessary to counteract extra exposure, and the age and weight of the men. Stress is laid on the fact that the recruit, still more or less a growing lad and undergoing a course of physical training to which he is unaccustomed, requires more food than the trained adult soldier.

During the period of the war the Inter-Allied Scientific Food Commission, recognizing this fact, recommended that young recruits should receive extra food representing an energy value of 200 calories per head per day in addition to the ordinary army ration. The Food (War) Committee of the Royal Society, relying upon direct measurements of the expenditure of energy by recruits undergoing training for war, recommended that the recruit of average size should receive a diet representing not less than 3,750 calories per day.

In the construction of army diets, except for recruits, any qualification to meet the needs of size and weight can only be permitted to a very limited extent. It would be impracticable to provide a series of diets to meet the variations from the average of all the different arms of the service, and so an average normal ration is provided which, in practice, has met all requirements. In special cases, however, some increase in the diet for men of greater size than the average, and engaged in intensive labour, is called for. During the war, for example, men engaged in quarrying and in lumber felling received an increased diet amounting to well over 5,000 calories per man per day. The energy expenditure of the soldier in relation to his food was fully investigated by Cathcart and Orr in 1918. These observers determined by direct calorimetry the energy expended during all the phases of a soldier's daily life, and stated that the soldier in training for war must be supplied not only with ample food, but must have body reserves in the form of fat and other

ARMY RATIONS

material so as to maintain his efficiency when compelled by exigencies of service to lose touch with his source of supply

It is now customary, when framing a soldier's diet, to take into consideration, in the first place, the energy expenditure under the different conditions of service, including that due to the weight of the load to be carried, and the probable nature of the anticipated warfare, whether mobile or stationary. The energy expenditure is determined by the direct method of Douglas and Haldane, since this method is particularly adapted to mobile subjects. The energy expenditure of the soldier at the present time under peace conditions amounts to approximately 3,380 calories per man per day, and since the food must contain more energy than the man is expending, the present army peace ration has been fixed at 3,600 calories per day. Experience has shown that the men do well on this daily allowance and gain weight.

Cathcart, Richardson, and Campbell have shown very definitely that a load equal to one-third of the body-weight is the maximum which a soldier should carry. Since the average body-weight in our army is about 135 pounds, this would mean that the maximum weight of clothing and equipment to be carried by the soldier should not exceed 45 pounds. In France during the war the men were required to carry a load of approximately 80 pounds in weight, and in the winter, when the clothing and equipments were wet and muddy, a weight of over 100 pounds was not infrequent. The load carried and the method of adjustment have considerable bearing on the energy expended, and hence on the food requirements. If the load is excessive or ill-balanced the value of the normal dietary may be influenced considerably.

Variety, so essential in all dietaries, is often difficult to obtain in the field, and can only be given as was done

THE PRACTITIONER

in France, by the substitution of certain constituents of the diet by others in equal proportion, having regard to their food value—for example, mutton or preserved meat for beef or fruit in lieu of vegetables. Variety was then often more or less compulsory (and would be again, when shortage of certain foodstuffs from economic difficulties occurred), and substitutes had to be found.

In peace, variety in the ration is obtained by allowing a certain amount of commutation of some of the constituents of the normal ration, the kind and amount being laid down by the War Office, and also by making use of daily menus prepared by all units based on a monthly menu issued by the Supply Branch of the army. Variety and also economy have followed the improvement in army cooking, which has made great progress since the war. Climatic conditions call for appropriate modification of the rations as regards protein and carbohydrate requirements. Diets can, with advantage, be reduced during the summer, even in temperate climates, thus tending to economy. Food supplied for active service in the field must be portable, with good keeping properties, and as far as possible should conform to that which the bulk of the men are accustomed, hence bread, meat, and bacon form the staple articles of the ration. Owing to the increased wear and tear, loss of sleep, exposure, continued mental strain, and extra liability to contract disease, an ample ration, well-balanced in constituents, portable, varied as much as possible, easy of digestion and assimilation, and containing a due proportion of vitamin-containing foods, is essential for the needs of an army in the field. Experience has shown that a ration of this nature must afford an energy value of at least 4,000 calories per man per day, anything short of this being inadequate.

The protein requirement for men in the field has led

ARMY RATIONS

to much controversy, but the opinion held by all experienced military observers is in favour of a somewhat higher amount than for peace requirements. The stimulating effect of protein is of distinct value, and personally, after long experience, I have seen no ill effect whatever from quantities ranging from 120 to 140 grams per man per day. For men on the lines of communication other than for those in training camps or engaged in extra hard labour, the protein requirements need not exceed 100 grams per day, and the total calorie value of the ration as a rule need not exceed 3,350.

One of the great difficulties of catering in the field is the regular supply of the right proportion of food-stuffs containing the necessary accessory food factors. When wholemeal flour is used for bread and biscuit, and fresh meat and fresh vegetables or fruit are available and prolonged cooking is avoided, any army has little to fear from the occurrence of deficiency disease. It is, however, often impossible for the Supply Branch to maintain a regular supply of fresh vegetables in the field, although potatoes and onions are generally available. Apart from scurvy, many of the septic skin conditions and what is termed "inflammation of connective tissue," may be encouraged by a lack of vitamin-C. Dried vegetables in lieu of fresh are now prohibited in the army, and when vegetables fail recourse must be had to fruit.

Although lime juice is included in army field rations, to be issued only on the advice of a medical officer, its value has now not the same significance as formerly, since the field ration normally contains a sufficiency of accessory food factors.

During the war Dr. Harriette Chick observed, however, that the lime juice then issued had little or no antiscorbutic value; indeed, the term lime juice until the middle of the nineteenth century was used to

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describe the juice of lemons. Lemon juice made from fresh lemons and which contains the pulp and a certain percentage of volatile oil from the rind is now substituted for lime juice in our army.

In the event of any deficiency disease arising, recourse can always be had to yeast extract and to germinated pulses, which on occasions have proved of the greatest value, and are easy of preparation in the field.

It must be remembered that in war, not only is deficiency disease to be guarded against, but that such conditions as war oedema, intermediary stages of fatigue, depression, headache, indigestion, and melancholia may all be associated with a lack of vitamins.

It does not appear to be generally known that alcohol forms no part of a soldier's ration, either in peace or war, and that it is only issued on special occasions on the advice of a medical officer. We are all aware that in the past war, a ration of rum on occasions was beneficial in the exceptional circumstances of life in the trenches in the winter months, when men were exposed day and night to inclement weather, fatigued beyond measure, and exposed to constant mental strain. A certain amount of alcohol, preferably given at the end of the day, is beneficial as a gastric and nerve stimulant to men under circumstances such as these, but habitual use is not justified under any circumstance of service in the field.

Food and the Public Health.

By WILLIAM J. HOWARTH, C.B.E., M.D.

Medical Officer of Health for the City of London.

IN no branch of preventive medicine has greater activity been shown in this country since the war period than in that relating to the control and supervision of the food supply. No doubt the war experience contributed materially to this end, for all will recollect the importance which the food problem assumed during that period of strife. Mere bulk of food assumed a lesser importance than character; the variety of possible substitutions was emphasized in both this country and abroad; the discoveries of unknown factors in food, the absence of which profoundly affected health and well-being, and the dependence of this country on oversea supplies, were all matters of intimate concern for every citizen in the land. Government of the people in the exceptional circumstances which developed necessitated the promulgation of such a series of food-controlling regulations as no one had ever before experienced. In co-operation with the Government the Press lent its services. The public received instruction in the reasons for this or that restriction; discourses were prepared on the scientific use of food; abstruse physiological problems were set out in simple language; and generally, it may be stated, that one of the advantages derived from this period of trial was that the people of this country became better instructed in food hygiene—using the words in their broadest sense—than at any previous period in history.

It would have been cause for wonder, therefore, if

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searches on rickets and scurvy, and the indications that many of the dental troubles of to-day may be attributed to irregularities of feeding.

A brighter view is the improvement in infant mortality, a feature of the last twenty years. To what extent the reduction of dirt or of contaminating organisms has been responsible has not yet been fully demonstrated, but I think one may safely say that, notwithstanding the laudable devotion of that band of women workers who, under the auspices of progressive local authorities and numerous voluntary agencies, have applied themselves to this problem, success would not have been so pronounced had pasteurization and the commercial production of dried milk not been a concurrent association with this activity. In this connection it is of interest to note that pasteurization of milk became an increasing necessity to avoid the wastage of a valuable product which defective methods of production, distribution, and storage rendered increasingly requisite.

So much attention has been paid to disease in relation to food that there is a danger that it may be over-assessed, which thought arises when one contemplates some recent views on the causation of cancer. The actual cause and exciting factors seem in danger of being confused, but perhaps it depends on the point of view of the contributor. To one who is keenly interested in the cancer problem the temptation to elaborate the thesis is considerable.

Just as food is better regulated to-day than ever before, so is scientific inquiry into the problems more active. This activity is not limited to private laboratories, as is proved by the work of the Food Investigation Board of the Department of Scientific and Industrial Research. This Board consists of a central executive, under the able direction of Sir William Hardy, secretary of the Royal Society, and distributes

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of slaughterhouses has been arranged by bringing under control those existing in rural areas.

The prohibition of the addition of preservatives to food has been decided upon and will shortly be operative. The delay of a year or two has been necessary to avoid a dislocation of trade. The limited number of foods to which preservatives may be added is now stated, as well as the particular preservative and the maximum amount. This measure will do much to clarify a situation which has been full of doubt and a source of irritation to all concerned.

Public health has received protection in other directions; for example, new powers exist which are intended to lessen the risk of milk infection by tuberculous employees; the powers to control places in which food is prepared as contained in the London County Council (General Powers) Act, 1908, have been extended to the provinces by the Public Health Act, 1925, with one or two important supplementary clauses. The notification of cases of food poisoning has been approved in the City of Edinburgh, an administrative measure which seemed sooner or later sure to follow the interest which has been displayed in this subject in recent years. Finally, one may refer to the increasing part which the members of the veterinary profession are playing in preventive medicine. The new Diploma in Veterinary State Medicine, and the development of research in comparative anatomy, are subjects which will prove of future benefit to the community.

This brief summary of recent advances surely indicates that the reproach against public health work in the matter of food hygiene will soon lack justification if that position has not already been reached. Post-war progress has been so considerable that an enormous leeway has been made up in a comparatively brief period of time.

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which present difficulties in the way of later supervision are allowed to be admitted accompanied by the approved official certificate.

Standards of composition for varieties of dried milk and condensed milk have been established, and although regulations still allow of the sale of skimmed milk products, these clearly require that the tins containing such milk should be marked "Unfit for Babies." The date of manufacture of tinned food is also not yet a compulsory announcement.

Improvement in the milk supply has received an impetus from the "Designated Milks" Order, which seems to establish the principle that milk produced under certain specified conditions shall receive the advantage of an official designation. Seeing that the standard of excellence receives approval, it is not a far step to require that a milk which does not reach a reasonable minimum in standard shall receive correspondingly definite official disapproval. The new order has stimulated local effort, and doubtless the day is not far distant when a minimum standard of suitability will be created. The present position with respect to "Pasteurized Milk" is unsatisfactory, since the use of the words is strictly limited to milk treated under approved conditions. The position ought to be that disclosure should be required whenever milk has been so treated by heat, but that the treatment should be limited to approved methods. At present anyone can sell heated milk without control and without declaration—an obviously unsatisfactory condition.

Departmental committees have been set up and have reported on both meat control and preservatives in food. In each instance regulations were framed with commendable promptitude bearing on the subject and in accordance with the committee's recommendations. Meat inspection, handling, and marking, have been placed on a better footing, and additional supervision

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Diet in Public Schools.

By L R LEMPRIÈRE, OBE, B A, MB, CH B

President of the Medical Officers of Schools Association

THE health of the adolescent is unquestionably of prime importance, and it is universally agreed that the individual can be made or marred by the conditions of his or her earlier years, and in these conditions diet takes a foremost place. There is no other subject upon which so many feel entitled to air their views, and upon which opinions differ so much. So diverse are the views that the only dietetic articles condemned by nobody appear to be water and the orange! However, no one can possibly ignore or fail to appreciate the immense value of the discoveries made and the work done in this connection by Sir F. Gowland Hopkins, Dr Plummer, Dr Hamill, and other eminent workers, and it may be of interest to review in some measure an average public school diet of the present day in the light of modern discoveries.

Of school medical officers, the late Dr. Dukes, of Rugby, the bulk of whose views hold good to-day, years ago laid the foundation of school diet, and much good work has been done more recently by Dr. Friend, medical officer of Christ's Hospital, to whom the writer is indebted.

It must be remembered that diet is not an end, but a means to an end. What, then, is the criterion of a good school diet? It postulates not merely the absence of illness, but a steady level of good health, with a more or less regular growth and rise in weight.

Good health is affected in several ways, the chief of which are diet, exercise, sleep, and environment, and it is obvious that the difficulties of assessing a right value to any one of these factors is great, and par-

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ticularly so in the case of diet.

Public school diet presents the same problems and difficulties as in the larger world, accentuated for two main reasons: That it deals entirely with (1) a very active and constantly changing individual, (2) mass conditions, where all must feed alike. Theoretically, the school medical officer is the best judge of an efficient diet, and he should have a large control in this subject, but of ten whole-time medical officers five have only a partial control, and three none. This is the first weak spot in school dietetics. As this article does not aim at being a scientific exposition, but is rather the practical experience and observations of the writer with over twenty years' intimate experience of public school life, reinforced by the facts and opinions given by a considerable number of other school medical officers with similar experience, it would be as well to present some of the facts obtained, and see how far they comply with modern requirements and secure the object aimed at, the good health and growth of the individual. Subjoined is a sample food value table at one school

	Oz	per week	Calories
Bread - - - - -	100		7,700
Oatmeal - - - - -	3		348
Flour - - - - -	8		816
Sugar - - - - -	16		1,808
Butter - - - - -	8		892
Milk - - - - -	90		1,800
Meat - - - - -	71		4,015
Bacon and Pork - - - - -	14		1,820
Sausages - - - - -	6		636
Pork Pies - - - - -	2		130
Corned Beef - - - - -	3		195
Fish - - - - -	14		308
Soup - - - - -	30		—
Eggs - - - - -	4		252
Cheese - - - - -	3½		347
Potatoes - - - - -	80		2,000
Greens - - - - -	10		90
Jam and Preserved Fruit - - - - -	15		1,050
Fresh Fruit - - - - -	4		44
Total Calories	per week, 24,851	per day, 3,550.	

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Compared with a similar table of thirty years ago this represents an increase of nearly 700 calories, and from that point of view is a generous diet, although none too generous in practice, considering the rapid growth and enormous activity displayed.

There are certain definite weak spots: for instance, the small allowance of the fatty foods, butter and milk, also of green vegetables, the absence of stone-ground flour, and the very poor allowance of fresh fruit, the first deficiency is usually made good by the supply of cod-liver oil from the medical officer, the latter by the purchase of fresh fruit by the boys themselves, which they will always buy if they can.

The proteids and carbohydrates are ample, and these could be curtailed with advantage if the other deficiencies were made good, so as to secure a more nutritious and balanced diet.

The answers to the questionnaire sent to twelve large public schools for boys and four for girls are tabulated overleaf, with one industrial school return for comparison, and an analysis of some of them is not without practical interest. The numbers, though small, are quite typical and representative. Practically all are agreed that the feeding is much better than twenty years ago. The old bread-and-butter tea has been in general supplemented by an extra dish which was undoubtedly wanted, in one school this addition has entirely eliminated the hams, tongues, chickens, etc., previously supplied from home which filled two large meat safes. Although originally confined to vegetarian dishes, they have been in part replaced by meat ones, with no apparent physical or moral harm. This implies meat twice a day at least, which is none too much. Years ago meat at the evening meal was supposed to arouse the "animal passions," but school morals have improved in spite of the introduction of this meal.

In many schools a similar deficiency of fats, green

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Public Schools	Time Allowance for Meals (compulsory)	Extra Dish at Tea	Vegetarian Dishes	Optional Meals. Is Attendance good?	Fresh Fruit
Boys					
1	Breakfast, 25m Dinner, 30m Tea, 25m	Yes Meat.	Sometimes Baked beans popular	Supper 60-70%	Oranges occasionally Always in Sanatorium
2	Breakfast, 30m Dinner, 35m Tea, 30m	No	No	Two biscuits at supper No	Once a week.
3	Breakfast, 30m Dinner 30m Tea, 30m	Yes	Yes Are liked if well made	Afternoon tea in summer Milk and biscuits at bedtime	Not as a rule Sometimes on on Sundays
4	Breakfast, 30m Dinner, 40m Tea, 30m	For senior boys only	No	Light supper for late prep 90%	Cooked fresh fruit when in season often Apples, oran- ges, bananas occasionally
5	Breakfast, 20m. Dinner, 30m Tea, 25m.	Generally Meat very occasionally	No	No	Very occasionally
6	Breakfast, 30m Dinner, 35m Tea, 15m Supper, 22m	Not always Meat sometimes	Yes Not very popu- lar Craving for meat	No	Apples from own orchards Other fruit occasionally
7	Breakfast, 30m Dinner, 30m Tea, 30m Supper, 30m	Yes Meat or eggs	No	No	Stewed fruit in summer
8	Breakfast, 15m Dinner, 35m Tea, 15m	Eggs at times	Salads occasionally Not popular	Cocoa, 7 a m Tea, 4 30 Very popular Supper, 8 30 Well attended	No Boys provide their own Always supplied in Sanatorium
9*	Breakfast, 30m Dinner, 40m Tea, 30m Supper, 10m	No	No	Lunch Well attended	No
10	Breakfast, 30m Dinner, 30m	No	No	Cocoa 7 a m Badly attended	No
11	—	Yes Hot dish or cold meat	No	No	No But cooked in summer fre- quently
12	Breakfast, 15m Dinner, 30m Tea, 15m	Yes Meat.	Yes, at tea Some are quite popular	Cocoa, 7 a m Afternoon cocoa Light supper	Once a week in fruit season Additional stewed fruits, apples daily when in season
Girls					
1*	Breakfast, 30m Lunch, 15m Dinner, 25m Tea, 25m Supper, 25m	Yes Meat at supper	Yes, at supper Popular	No	Daily at supper
2*	Breakfast, 25m Lunch, 5m Dinner, 30m Tea, 20m Supper, 25m	—	Yes, at supper Occasionally appreciated	No	Three or four times a week
3*	Breakfast, 30m Dinner, 30m Tea (light) Supper, 30m	Yes, at supper	Yes, at supper Not popular	No	Once a day
Mixed boys and girls *	Breakfast, 25m Dinner, 30m. Tea, 30m	Yes Meat given	Yes Much appreciated	No	Daily in winter Some times twice in summer
Indus- trial *	Breakfast, 30m Dinner, 30m. Tea, 30m.	No	No	No	Once a week.

* No food allowed except at meal times in these schools

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Daily Average Allowance	Bread Used	Are Private Extras Allowed?	Are they Better Fed than Twenty Years Ago?
Butter 1½ oz Milk ½ pint Bread 13 oz. Meat 7½ oz	Standard and white	Yes, at B and T Jam	Yes Very distinct improvement in variety amount, and service
Butter } Milk } ad lib Bread } Meat }	White	Yes at T Eggs, cake, potted and tinned meat or fish	About the same
Butter, 2 small pats Milk Bread } ad lib Meat }	White	Yes only from tuck shop, not meat Used as relishes, not as food	Yes
Butter 1 oz Milk ½ pint Bread 11½ lb Meat, 8 oz	Stone-ground 80-90°	Yes at T No tinned foods	Yes Diet now adequate Well cooked and served
(1)	White	Yes at T Potted meats and jam	Very much better fed
Butter, 1½ oz. Milk Bread } ad lib Meat }	White	Exceptionally Usually eggs at T	Yes
Butter, 1 oz Milk Bread } ad lib Meat }	White	At B and C Potted meat, jam, sardines, cheese	Yes
Butter, 2 oz Milk Bread } ad lib Meat }	Stone-ground, 40° White 50°	Yes B, anything D, pickles T, potted meat, jam	Most certainly The poorer boy is probably better fed than at home Pocket money is unnecessary Probably rather better
Butter 2 oz Milk, ½ pint	White	Yes B, jam T, cake, jam	
Butter, 1½ oz Milk Bread } ad lib Meat }	White	D, pickles and sauce T, tinned food jam, force, etc	Yes
—	White	Yes, at B and T	Much better
Butter ½ oz Margarine ½ oz Milk, ½ pint Bread, 11 oz Meat, 10 oz	Stone-ground 80°	B and T Potted meats, jam force etc. D, pickles	Much better
—	Stone-ground Occasionally white which is more popular	Only at T Birthday cake Sweets twice weekly	Yes Especially in fruit
Butter 1½ oz Milk, ½ pint	Stone-ground	No	Yes
Butter 1½ oz Milk, ½ pint. Bread, 8 oz Meat, 4 oz Butter, 1½ oz Milk, ½ pint. Bread } ad lib Meat }	Stone-ground and white A change is liked White and stone-ground	No No	No No change
Margarine, 6 oz. Milk, 1 pint Bread, 11 oz Meat, 3 oz	White	No	No

vegetables, and particularly fresh fruit, is to be noted. In only two schools (one girls, one mixed) is there anything like an adequate supply of the latter, which is in the main made good out of the boys' private pocket.

It is a matter of much regret that stone-ground flour, which is the main source of vitamin-B, is so seldom used. Experience shows quite clearly that when tried it is soon liked, if some white flour is mixed with it and it is eaten fresh; 80 per cent. is a good average. Incidentally, the initial cost is slightly less, it goes farther, and boys do not eat so much, therefore it is economical as well as being more nutritious and more of a laxative; but it does not make good pastry. Vegetarian dishes are not popular as a whole, though some are a real success if not given too often—for example, cheese and tomatoes, braised carrots and gravy, onions and gravy.

Time of Meals.—In all cases there is an average of about five hours between the principal meals; in the winter months this is too long for some, and an optional light lunch in the morning and tea or cocoa in the afternoon should be provided, and in the summer, where early school still exists, some food should be insisted on before the first lesson. The fear of damaging a boy's digestion by calling on his gastric juices too frequently by these supplemental meals is a pure myth. In the girls' schools these supplemental meals are compulsory, and they are better fed than the boys, a complete reversal of the tables of bygone years.

The time allowance is inadequate in several instances, a minimum of twenty minutes for breakfast and tea, and thirty-five minutes for dinner, should be insisted upon, the two former meals, which, as a rule, are not so official as the mid-day one, are very liable to be curtailed and rushed.

How soon should exercise be allowed after meals?—Theoretically one hour is always insisted on by the authorities and dietetic experts, but it is hard to find

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any records of illness or injury, acute or chronic, which could be put down to violation of this rule, though fives, squash racquets, gymnastics, and tennis have for many years been played within this interval. Provided runs and football are prohibited, half-an-hour's interval seems ample, it is not natural for any young animal to keep quiet after a meal.

Another vexed question is the supply of personal extras through the parents' pocket, either from home, the school tuck shop, or outside shops. In all boys' schools but one this is allowed, but in none of the girls' schools. In my opinion, supported by most of the other medical officers, very strong evidence of its deleterious effect should be brought before this time-honoured custom is abolished. It gives an enormous amount of personal pleasure, a boy values his own pot of jam far more than any provided by the school, and values the privilege of making his own tea and doing some amateur cooking, which often leads to a social interchange between master and boy, and is of real value. However, the amount and quality need closer supervision. The supply of money should be limited, far too much is allowed. An average of £2 per boy per term spent on extra food is probably no exaggeration. No extra home food should be allowed without the sanction of the house-master, and all other extras should be bought at the school tuck shop only, which should be under the management of the members of the staff, the profits reduced to a minimum, and those gained used for the benefit of the school at large. Wisely managed, the tuck shop is a valuable asset, but the uncontrolled supplies of food and pocket-money sent by so many parents are not only unnecessary, but are a very real danger and call for reform and restriction.

No food should be allowed to be eaten before any of the three chief meals, and the tuck shop should be open

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only in the short morning break and after dinner.

Faddiness and Grumbling.—Almost all of us agree that boys (and girls) are very faddy, especially the younger ones, and a particular dish will be refused by many and boycotted without trial, if one or two set the example. The writer has, from time to time, insisted on small boys eating such a dish with excellent effect on the rest, the alternative being medical inspection and a probable dose of castor oil. If a dish is universally unpopular, there is some good reason for it. Most of the faddiness has been learned at home, and may in part be due to the very small families that generally obtain nowadays, with the inevitable spoiling of the only child. The born grumbler is much more rare, but generally exists as in other branches of the community, and constitutes a real danger.

Fish in bulk is very difficult to cook and serve in an appetizing way, whatever the pundits say, and is never as popular as meat. Boiled fish is condemned wholesale. Fish pies, fish cakes, kedgeree, fish fried in oil, are the best methods, and are much more appreciated if only a few tables are served at the same time. Cold fish with salad and mayonnaise dressing is excellent in summer. Fresh herrings and mackerel are most valuable breakfast and tea dishes. A hot service for fish items is imperative.

This leads to two of the vital points of school diet, cooking and service, and there is no question but that these are in practice far more likely to be at fault than the food. From this point of view, the boarding-house system of feeding fifty or sixty boys together is distinctly preferable to the hostel system of feeding five hundred. It is much more difficult to procure good attractive hot dishes for five hundred than for fifty where boilers have to be used in place of large saucepans, for example, for vegetables, and where fish and other items must necessarily be cooked in batches. A similar difficulty applies to a quick efficient

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service, and good table setting, crockery, linen, etc., with its unconscious, but very real, accompaniment of reasonable decorum and good table manners. It is unfair and untrue to say that the boarding-house master waxes fat at the expense of his boys. Nothing of the sort; the same libel might apply with equal untruth to the hostel school. In each case there may be, and no doubt are, errors of ignorance, but in these days of mixed diet and large varieties of food a house-keeper or steward cannot go very far wrong with medical supervision, though in the case of the boarding-house school, the Eastbourne system of a general expert caterer to advise all the houses is worthy of extended trial. The crux of the whole matter is the cooking, and there is no more false economy from all points of view than a cheap or inefficient cook; a good cook is above rubies.

In drawing up a school dietary the following general points—very obvious ones—must be kept in mind.—

A. FROM THE BOYS' POINT OF VIEW.

(1) It must be sufficient and, indeed, generous. The 3,500 calories mentioned before is not too much. Can a boy be overfed? At home, Yes; at school, No. His natural inclination or compulsion for games, the really strenuous life he leads prevents this. Any form of indigestion is very rare, except, perhaps, the acute type following a Saturday "grub," which is quickly cured by Nature or castor oil. Normally, a healthy boy's stomach is as elastic and tolerant as his heart, and cannot be deranged. The complaint of stomach-ache almost certainly suggests the appendix; but the causal connection between appendicitis and diet is not yet proven.

Constipation, indeed, is common, and is probably affected by the preponderance of carbohydrates alluded to, and the comparative absence of fresh vegetables and fruits, though environmental conditions and previous

bad habits, so often alluded to on the medical sheet on entry, play a part. A certain number of cases of feverish chill, the bugbear of the school medical officer, may be assigned to this cause (constipation), but certainly not the bulk of them, which without any doubt arise in the upper respiratory tract and are so clearly influenced by atmospheric conditions.

It is stated that resistance to disease and infection is much lowered by wrong diet, this may be true in the poorer classes, but there is no evidence of it in the public school. The exanthemata come and go. Influenza comes like a bolt from the blue, but no connection with diet can be traced.

(2) It must be nutritious, and supply the necessary vitamins. Of these by far the most likely to be deficient is vitamin-A, though theoretically there is a bigger deficiency in both vitamins-B (where stone-ground bread is not eaten) and C, the latter being made good out of the boys' pocket.

The most trustworthy guide to a nutritious diet is weight, and there is no better test of good progress than rise of weight plus good health. Every boy up to the age of sixteen should increase in weight during term, after that age this is not nearly so important. The rate of increase varies in different boys, but each boy has his own normal rate, worked out by Mr. Hawkins, of Haileybury, many years ago as the result of a large number of observations on public school boys, and published in the form of graphs, which are of the utmost value in assessing any given boy's progress. Weights should be taken at least twice a term, better three times. It will be found that loss of weight or diminished increase during term time is due to . (a) coming back too fat—a common cause, (b) illness; (c) fatigue (the result of over-exercise, or insufficient sleep), more often than to dietetic errors.

(3) It must be palatable. Boys will not eat what

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they do not like because it is good for them, and until we adopt Prussian methods, they will continue to exercise their choice. They like even of their favourite dishes, and variety and absence of routine, insisted on by all, is of the utmost importance. It is better to serve at times a less nutritious dish and maintain the food balance than insist on a too rigid observance of the dietetic laws. A boy's appetite in the main is a very good judge, and what he enjoys is more likely to be assimilated.

B FROM THE SCHOOL POINT OF VIEW.

(1) It must be easily cooked and served. This has been alluded to above. In these days of universal domestic difficulties, the problem is more acute in public schools than elsewhere, and school diet is unquestionably affected by the generally poor type of girl that drifts into (and out of) the school kitchen; this applies more particularly to the provision of extra dishes at breakfast and tea in the hostel school.

(2) It must be economical. From a practical point of view, this must be faced. Here, of course, the hostel school is at a great advantage compared with the boarding-house. But in no school have the fees gone up anything like commensurate with the cost of living, and many schools must be hard put to it to make both ends meet. School fees in the list on pp 196-197 vary from £130 to £270 a year, and the diet is bound to vary too. The surprising thing is that such a liberal diet should in general be applied. Variety is excellent, but to vary oatmeal with rolled oats, grape nuts, etc., costs 100 per cent more. Half an ounce extra of butter a day costs £300 a year in a school of 500, an apple a day, £600; an extra dish at tea, £1,250.

Staple meat dishes must remain—legs and shoulders of mutton and large rounds of beef, at least amongst the schools with lower fees. Made-up dishes, stews,

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hot-pot, cottage pies, rissoles, still must, and do, appear on every one of the school diet-sheets. That the public school diet of the present date is on the whole good, and meets reasonable requirements, in spite of the numerous letters and criticisms which appeared in the newspapers a few years ago, is supported by the fact that the bulk of school medical officers agree that while the physique of the boy now entering school life is less good than his predecessor of twenty years ago, the large majority of the weedy delicate boys improve in health enormously during their school life.

CONCLUSIONS.

The main points may be summed up as follows.—

(1) The school medical officer should have a large control in the dietary.

(2) Public school feeding has much improved in the last twenty years.

(3) The allowance of butter should be not less than $1\frac{1}{2}$ oz. per day, and of milk $\frac{3}{4}$ of a pint. Fresh fruit should be provided every day, and stone-ground flour (80 per cent) made compulsory.

(4) The cooking and service are much more often at fault than the diet, and this is more true of the hostel than the boarding-house school, and more true of boys' than girls' schools.

(5) While extra private food should be allowed, its purchase should be confined to the school tuck shop, which should only be open at stated periods, and the amount of pocket-money should be restricted.

(6) Illness due to overeating is very uncommon, and dyspepsia practically unknown; but constipation is common, and this is the most serious fault that can be laid to the diet sheet.

(7) Meat can be eaten with impunity and benefit twice a day.

(8) Moderate exercise at an interval of half an hour after meals is not harmful.

Dietetics in Institutions for Children and Young People.

By G. H. CULVERWELL, M.D., D.P.H.

Medical Inspector of Reformatories and Industrial Schools, Children's Branch, Home Office

I USE the word "institutions" in my title to signify those residential schools and places of training for children which are maintained wholly or to a large extent by public funds or by voluntary subscriptions—in other words schools where the expenditure in connection with the dietary must be the minimum which will ensure an adequate food supply. It is important to recognize at the outset that a considerable proportion—in some cases a very high proportion—of children who come under institutional care have spent their earlier years under adverse conditions and may also rank amongst the less fortunate in their physical inheritance. If these children are to gain the maximum benefit from their life and training in the school we must be able to rely on the dietary to play no small part in restoring their impaired health and in making good their arrears of growth.

Plainly, then, the problem of successful feeding in institutions has difficulties not encountered to anything like a corresponding extent in secondary or public schools, since in the latter the dietary is generally required to maintain, rather than to establish, proper standards of health and growth, and at the same time the need for economy is not so pressing. I shall therefore try to mention here some of the main considerations which bear on these difficulties and the chief defects

which are apt to arise out of them.

To be successful in promoting healthy growth, it is essential that the dietary in an institution shall meet as nearly as possible the daily needs of each individual child, both in the quantity and nature of the food which it supplies. These individual needs of course vary considerably, and are affected by such factors as age, season of the year, and the child's routine for the time being. Judged by such a standard, and setting apart as far as possible the influence of all matters other than the food supply, the measure of success attained by the dietary from one institution to another is variable. The explanation of such differences may of course be found in variations in the total caloric value of the food supplied per child from the respective school kitchens; but inferior results are, perhaps, quite as likely to be due to defects in the balance of the dietary, to lack of variety in the catering and methods of cooking, or to the faulty service and arrangement of meals.

Catering.—On the efficiency with which the school catering is done depends to a large extent both the variety provided by the dietary and its cost. The arrangements made for the buying of food should enable ruling prices to be followed as closely as possible so that purchases are made to the best advantage, and opportunities can be seized of obtaining reasonably food which cannot otherwise be provided. It must be admitted, however, that really good buying is no simple matter, especially in smaller institutions where the purchase of food is only one of many duties falling on the officer concerned and where the situation of the school—often in the heart of the country—may compel a certain reliance on “standing orders.”

Variety is a matter which only too often receives nothing like sufficient attention in school catering. It is obvious that the more varied the nature of the food supplied the better the chance of meeting the individual

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needs of the group of children and adolescents comprising the average school. Hence the need for including in the dietary a wide range of foodstuffs

Bearing in mind the great disparity in opportunities for relaxation and for change of scene, food and outlook, which exists between the holidays of children in institutions and those of boys and girls in ordinary life, special care should be taken to make the fare especially attractive and varied during the holiday periods

The Dietary Scheme—The dietary scheme, which determines the dishes provided and their composition, must be varied and capable of ready adaptation to meet summer as well as winter conditions. It should never consist of a rota of meals on which the same breakfast, dinner, and tea appear in an endless sequence on the same day of each week. Excepting when some special treat is known to be in store, the less children know beforehand about their meals the better, and any rota should preferably cover at least three weeks.

Whatever form the dietary scheme takes, it will be found useful if the housekeeper and cook have at hand simple data from which they can readily determine the amounts of ingredients necessary to produce any given dish in proper quantities for varying numbers of children. Unless this is done mistakes are apt to be made, and there is sometimes a tendency to keep to amounts calculated originally on a basis say of 100 boys, after the numbers have risen or fallen materially.

It is desirable that no breakfast or tea meal should consist only of bread and margarine or dripping, with a drink of cocoa or tea. Either porridge, jam, syrup, or some meat or fish food should also be given. At tea a little cheese occasionally is relished and a good deal of use should be made of salads, which are most valuable adjuncts to the dietary.

For institutions with an average age around fourteen years, a total value of approximately 3,000 calories

should be aimed at. When the average age is above this I agree with Dr. Friend who, writing of public schoolboys in a paper giving a number of helpful views on school feeding, advocates a daily allowance in the neighbourhood of 3,200 calories in such a case¹

The effect of climate and any special demands on energy made by the school training must also be allowed for in placing the total caloric value. Nautical and other schools in exposed situations may be found to need a decidedly higher total value than the average.

Whatever caloric value be regarded as sufficient the dietary scheme should give latitude in the total supplied to each child. The quantities of most foods allowed must necessarily be fixed within certain limits, but I advocate very strongly that both potatoes and bread spread with margarine or dripping should be supplied *ad libitum*

Where three square meals are given there should, in general, be no need to add "lunches" in the middle of the morning or afternoon. Breakfast should be the first event of importance in the school day, and the work done before it limited for the bulk of the children to a short spell of light domestic work. When any of the older boys and girls have duties which occupy them for more than an hour after rising, or are allowed to stay up much later than the rest of the school, small amounts of food may be given as soon as they have dressed or some little time before they retire.

Serving.—Many a meal which leaves the kitchen hot and appetizing loses much of its value through defects of one kind or another in the service. The main object is to see that the individual needs of the children are satisfied so far as the menu allows. Younger ones should be helped first, and ample time set apart for the meal, so as to encourage good mastication and avoid any necessity or excuse for bolting

The serving out at dinner is usually done either by

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members of the staff from side tables, or by senior children or monitors, each of whom is responsible for the serving at his own table. Whenever the age of the children allows, I have a decided preference for the second method, which, with tactful supervision, gives very satisfactory results in many schools.

The size of helpings should be kept within the amount which each child is likely to eat, so that second helpings are the rule. The practice of serving out the total available amount of a dish into equal portions, without regard to children's age or size, has only to be mentioned to be condemned. Other not uncommon mistakes are the serving out of the first course—in bad cases the second as well—before any of the children are allowed to enter the dining-room; and the giving of a second helping to one section of the school only on any given day. At breakfast and tea the serving is comparatively simple. In addition to any extras provided children should be able to help themselves at will from platters kept well supplied with bread and margarine or dripping.

I believe it is unwise to attempt to limit the water drunk at dinner, or to allow drinking only at the end of a meal, and consider that a supply of water and drinking vessels for each child should always appear at the mid-day meal. Indeed, children should have free access to drinking water throughout the day.

The dining hall and its appurtenances must, of course, be scrupulously clean and as cheerful and attractive to the eye as possible. Small tables seating six to a dozen children are to be preferred to the use of a few long tables, and chairs to backless forms. The heights of tables and chairs should be such that all children can sit properly. Considerations of economy ought not to prevent the use of tablecloths, and by encouraging competition between table and table in the way the cloths are kept, a good deal can be done to train children to mannerly behaviour at meals. Salt-

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caloric value, the vitamins can safely be left to look after themselves. But the qualifications involved in this statement are not lightly to be dismissed where dietaries in institutions are concerned. This is an aspect of the institutional dietary which I have discussed at some length elsewhere⁵. Efforts to secure a proper vitamin supply have the happy result of helping to safeguard the dietary so far as its mineral content and acid base balance are concerned, both of which are quite likely to be at fault if the vitamin content is low.

(5) The acid base balance may err on the side of acidity. This is liable to occur in a diet composed largely of cereals. The dietary should have a slight but definite positive base balance, and it will rest largely with the milk, vegetables, and fruit given to secure this. Valuable data bearing on this matter are given in the paper by Dr. Orr already referred to.

(6) Lack of balance is sometimes found where a dietary has grown up more or less empirically and where one class of food may bulk too largely. An instance of this is the undue reliance often placed on the dried pulses as a source of protein and as a presumed substitute for fresh vegetables.

It will be evident that an adequate milk supply is of paramount importance in the dietary of any institution for children. Whole milk should, of course, be given. Skimming, and the removal of the top-milk before issue, are dietetic crimes of the first magnitude which should not be tolerated.

A growing conviction of the desirability of a supply of milk considerably in excess of that often allowed leads me to hesitate to offer any opinion as to the minimum necessary. I can only say that I have been satisfied with the health and growth in schools where the amount given approximated to five pints per child per week.

If bread properly spread with margarine or dripping is allowed *ad lib.* at breakfast and tea, there should be

no fear of a shortage of fat. Butter can but seldom be given, and whilst readily conceding that its use in the school dietary is excellent as providing a luxus supply of vitamin-A, I believe that a satisfactory standard of health and growth can be secured without it, and so should find it difficult to justify, where children in institutions are concerned, the considerable expense involved by the provision of butter as a routine measure.

The school's supply of green and other vegetables should be as constant as possible. They should, I think, be served—apart from vegetables used in stews, etc.—not less than four times weekly, including greens twice at least. There is sometimes a tendency to rely too much on the onion, which, though an estimable vegetable, should not figure too largely or too often in the menu. In winter, and at any time when the vegetable supply falls off, oranges and apples both prove valuable supplements deserving of extensive use. Other fruits should be given in season as often as circumstances permit.

Defects in Cooking.—These may be due to some limitation in the kitchen equipment provided, such as lack of an oven for roasting. Stewed or boiled food should not be allowed to preponderate in the dietary. There is sometimes a tendency towards over-cooking in institutions, and this may become important where vegetables and other vitamin-containing foods are concerned, especially when they are cooked at high temperatures in autoclaves. The latter require very careful use. Whilst the steaming of cabbages and other greens is no doubt good so far as the conservation of potassium and other salts goes, it tends to leave the greens too strong in taste for children to eat them readily, and the better plan is, I think, to boil them in slightly salted water for just so long as is necessary to ensure proper cooking. In the case of potatoes there is,

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again on the score of conservation of potash, some argument for cooking them in their skins, but this leads to considerable waste of the protein layer in subsequent peeling. Mechanical peelers, which remove merely the outer corky skin, prove satisfactory in use, and obviate the waste and labour involved in hand peeling.

CONCLUSION.

A really well-balanced dietary has an important effect on the number and severity of the children's ailments. The amount of minor sepsis and of sores of the impetiginous variety should be small. Whilst some children seem to get chilblains in winter, whatever precautions are taken, these are very much in the minority, and the appearance of an undue number of chilblains should occasion scrutiny of the dietary as well as of the school routine—there may be some shortage of milk or of fats. Careful and regular measurements of height and weight should be recorded—preferably, I think, quarterly—so as to allow the physical progress of each child to be followed closely from the time of admission onwards. Efforts should always be made to find the explanation for lack of progress. There will, of course, be some children who will fail to improve even under the best school conditions, and whose primary need is for medical care and observation, so that any bar to proper progress may be discovered and, if possible, removed.

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The Criteria of an Efficient Diet.

By SIR F. GOWLAND HOPKINS, D Sc, LL D, M B,
F R C P, F R S

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THE following is but a brief personal appraisal of the bearing of modern experimental studies upon dietetics.

It is true that, nowadays, not only ordinary individuals, but the most self-confident of bon-viveurs, the most self-denying of ascetics, and even the most virulent of food-faddists will occasionally lose faith in their practice and consult a medical man concerning their diet. They look, however, for advice based upon experience of the human body more specialized than their own, and would be disturbed, and probably sceptical, if told that it was based even remotely upon, say, the experimental feeding of animals, or upon experiments made in a calorimeter. Not long ago, and perhaps even to-day, the practitioner consulted might more or less sympathize with that state of mind. "Better sound empiricism than imperfect science" "Mis-interpreted science has encouraged food-faddists more than any teachings based on experience and common sense" There is much to be said for the attitude thus suggested. But the practitioner will admit that when he is asked for advice concerning dietaries, something more is usually expected, a greater precision in detail, for instance, than he is able to give with real assurance. It is well, therefore, that he should take stock from time to time of current academic knowledge, to see whether it has anything to offer which may add to that assurance. In such matters even a little increase in definite knowledge is important.

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It is generally known that evidence has recently arisen from scientific experiments, and from observations inspired by them, to show that the previously accepted criteria of an efficient diet must be somewhat modified and extended. It has become clear that hitherto the importance of detail has been underestimated; that what natural foods contain in very small amount, may be, though for different reasons, as essential as what they contain in much larger amounts. In what follows some attempt is made to appraise very briefly the actual, practical importance (as distinct from the unmistakable academic interest) of the newly-won facts.

Scientific methods yielding significant results have been applied to the study of nutrition for about three-quarters of a century. The first third of this period was occupied by the gradual development of methods for chemical studies, which at first, owing to lack of detailed knowledge concerning the constitution of the foodstuffs, were of somewhat superficial character. Some exact conceptions however—for example, that of nitrogen equilibrium as an indicator of efficient nutrition—quickly replaced the previous vagueness of the field. Meanwhile by 1870 quite accurate knowledge concerning the rate of combustion of the foodstuffs in the bodies of normal and abnormal individuals had been won by quantitative studies of the respiratory exchange. Studies of the latter kind continued with increasing accuracy throughout the last quarter of the last century, culminating in the remarkable work upon human calorimetry for which American investigators deserve so much credit. Perhaps the most striking feature of these investigations is the exact agreement between the data obtained for the energy expenditure of the body on the one hand as calculated, on purely chemical and physical lines, from the respiratory exchange, and on the other hand as measured by direct

observation of the heat given out by the body. This agreement gives proof (for those who ask for proof) that the law of the conservation of energy holds in the body. It further assures us that we may know by experiment exactly how much of each of the energy-yielding foods is required to maintain an individual in the condition of nutrition present when we study him. It does not tell us directly whether that condition is normal and desirable, or otherwise.

At the close of the last century, and for a few subsequent years, the results of calorimetry dominated the scientific outlook upon nutritional phenomena. This is not to be wondered at. The accuracy of the results made them fascinating. It is greater than biological studies can often attain to. Moreover, the fact that the broad results obtained seemed to provide a criteria for efficiency in nutrition, without the necessity of considering elusive details, gave an appearance of finality to calorimetric studies. Yet the outlook of fifteen years ago has proved too narrow, for the very reason that it tended to ignore the chemical details of nutrition.

Calorimetric data are, of course, in no sense misleading, if their limitations are kept in mind. The energy content of a food supply must always be of fundamental importance as one criterion of its efficiency. It has only to be remembered that other criteria based upon the specific chemical needs of the body are of equal importance. The law of the conservation of energy is observed by the body whether its condition be normal or abnormal, but the body is so constituted that while duly extracting energy from a sufficiency of food, it may as an organized chemical system be itself undergoing disintegration.

Even those who fifteen years ago thought about metabolism too exclusively from the standpoint of thermo-dynamics, could not wholly ignore the importance of chemical details. They were fain to recognize,

for example, that an efficient supply of minerals is required for nutrition, and, of course, that no amount of fat or carbohydrate could replace a certain minimum of protein in the diet. The view was rather that all details were relatively unimportant so long as the needs for energy were met. We now know that certain quite specific chemical items in the food are of a prime importance, though they contribute nothing of significance to the energy supply.

These highly-specific needs of the body are illustrated by a call for particular characters in the protein it receives and for a balanced mineral supply. They are shown more strikingly, however, by its complete inability to dispense with those elusive constituents of a complete dietary, which we now know as vitamins. All such demands are made in particular by the young and growing organism.

The question of specificity in the protein supply must be discussed quite briefly. In the past many endeavours have been made to determine what is the optimal protein supply, and what the safe minimum. Till recently these endeavours were made without the knowledge of the fact that individual proteins have different nutrient values. These differences arise from the circumstance that the constituent units (the amino acids) from which the complex protein molecules are built up—occur in relative proportions which may differ widely in diverse proteins. From this circumstance and from the proven fact that the body has a quite specific and urgent need for a minimal supply of some of these units individually—since it cannot make them for itself—it follows that different proteins must, as nutrients, have different values. The building up of human tissue proteins during growth requires a certain harmonious balance among the amino acids employed. If we think in terms of some one of these substances of which a daily minimum is an urgent necessity, and especially

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of one which no diet-protein contains in excess, it becomes clear that to supply that minimum more must be eaten of a protein relatively deficient in this particular amino acid than of one which contains relatively more. Circumstances, indeed, may make its content of one particular amino acid the factor which limits the value (except as a source of energy) of the protein as a whole.

Many other considerations arise in relation with such facts, but the subject cannot be further pursued. The conclusions involved are real, and of more than academic significance. Their practical importance must not, on the other hand, be exaggerated. It is possible, though not proven, that a community may suffer in health from the consumption of a protein of an inferior nutritive quality. Thus, reliance upon the proteins of maize, which in the sense discussed have a low "biological value," may contribute to the etiology of pellagra. If this be so, less definite conditions of malnutrition may similarly arise under other circumstances. It is true in any case that vegetable proteins often differ widely from those of animal tissues, and more of them must be consumed than of animal proteins in order to reach equal efficiency in the promotion of growth. Children put upon a strictly vegetarian diet cannot usually consume enough food to yield an optimum protein supply. Fortunately, even in vegetarian households, the growing children are usually protected by an allowance of dairy products. In general it may be said that consideration of the varying values of proteins scarcely enters the field of practical dietetics in countries where variety in foodstuffs is secured, but the possibilities involved in the facts need to be borne in mind so that exceptional conditions may be met.

The question of the mineral supply may be postponed for the moment, and attention given to the subject of the [accessory dietetic factors of vitamins. It is

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important just now that the ascertained knowledge concerning these until recently unrecognized constituents of food, should be viewed correctly, and a proper sense of proportion maintained in basing conclusions upon the facts.

The following statement of fact is now based upon hundreds of experimental studies carried out by observers in nearly every civilized country

A young, growing animal, if fed continuously upon a dietary satisfying all the criteria which would have been deemed sufficient twelve years ago, containing, that is, an abundant energy supply, a right proportion of the right kind of proteins, sufficient fat and carbohydrate and a well-balanced supply of minerals, may yet cease to grow, and, after displaying characteristic symptoms of malnutrition, may quickly die. The only necessary condition for such an occurrence is that the materials supplied should first be freed from vitamins. The animal will then die, although its food is freely eaten, well digested, and fully absorbed.

It is, furthermore, a statement of proven fact when we assert that an addition to the above described dietary of material in amount equal to no more than one-tenth of one per cent (and probably much less) of the whole food eaten will—if it be the right material—convert that dietary into one which promotes growth and maintains health. In such potent material what we now call vitamins are contained. It was, indeed, owing to such facts as those just emphasized that a recognition of the existence of vitamins became inevitable. They are contained in natural foodstuffs from which they can, by various methods, be extracted and partially isolated.

The above dogmatic, but strictly accurate, statements indicate, however, all that is available for the actual definition of vitamins. They are constituents of natural foods, characterized by the fact that they

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exert a potent and indispensable influence upon metabolism, though present in strikingly small quantities. Any closer definition than this must await the arrival of further knowledge; but the reality of their existence and importance is already established. For although they have not been obtained pure, they are assuredly concrete substances with tangible properties. They can be extracted and, by suitable methods, obtained individually in highly concentrated preparations in which they display characteristic chemical properties. We know that at least four of these substances exist, each with its own indispensable function in metabolism.

This very brief survey cannot deal with the technique of vitamin research, nor even with the details concerning their distribution in foodstuffs. Its purpose is only to urge that the recognition of their existence has made it necessary to apply new criteria to dietaries and that properties of vitamins must receive attention in practical dietetics. It is, however, equally important to urge that the whole subject should be viewed in right proportion, and that theories concerning their functions should not go beyond the ascertained facts. It must be remembered that although it is sure that the absence of a single vitamin from a dietary involves specific errors in nutrition, we do not yet know how exactly any one of them exerts its normal influence in the body.

That the effects of vitamin deficiency observed in animal experiments are paralleled in the phenomena of human nutrition is proved first of all by the existence of deficiency diseases. So long as it is borne in mind that the circumstances involved in the production of a more or less variable clinical syndrome are necessarily more complicated than are the conditions secured in an animal experiment where only one factor is varied, consideration of the evidence offered by the incidence,

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the symptoms, and above all, by the prevention and cure of scurvy, beri-beri, and rickets, should be convincing on this point.

In respect of the disease last mentioned recent developments in knowledge are of the highest interest.

Cod-liver oil is universally admitted to exert a marked effect both on the prevention and cure of rickets. The results of a great deal of experimental work done by divers investigators, including those derived from a very elaborate study upon infants carried out at Vienna in 1921-1922, under the auspices of the Medical Research Council and the Lister Institute, have convinced the majority of those who give thought to the matter that this property of the oil is due to its containing a special vitamin. This particular agent is found in other animal fats, but most liver oils contain it in exceptionally high concentration. The actual isolation of the vitamin by Japanese workers is claimed, though probably without full justification. Highly-concentrated preparations have, however, been made. Now, partly at least as the result of a hint obtained during the Vienna inquiry just mentioned, experiments were begun in America and continued in this country, which show that certain fats previously incapable of exerting any influence upon bone formation—or cod-liver oil artificially deprived of such power—become strongly active in this sense as the result of exposure to radiations of short wave-length. The sensitive material in such fats is cholesterol, or substances (sterols) closely allied to it. It is likely that the radiant energy produces a definite chemical change in molecules of such substances, because the active form when once produced is remarkably stable. Presumably the activated sterol is identical with the vitamin, and the latter when naturally present owes its origin to solar radiation. On the other hand, it is well proven that efficient exposure of the body itself to the sun or to

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suitable artificial radiations is a powerful means of securing normal bone formation in the growing animal or child. It would seem, then, that a factor necessary for that process can be produced within the body itself, or, alternatively, can be conveyed to it in the diet. In each case it is produced under the influence of radiant energy.

Such facts are of striking interest in themselves, and they indicate that those who have believed in general hygiene as the essential preventive of rickets, and those who have attached chief importance to diet, were not so far apart as was thought. It is, of course, clear that under no conditions could such a process as that of ossification be normal unless the supply of calcium and phosphoric acid is adequate. Doubtless the specific needs of the growing body extend to the details of its mineral supply, but under practical conditions the only deficiency at all to be feared would seem to be one of calcium, and this only in the cases of the nursing mother and the growing child. Under quite exceptional circumstances a dietary may contain too little iron. A diet composed of meat, bread, and potatoes is one illustrating calcium deficiency, but the error, whenever it occurs, is easily corrected by a reasonable consumption of milk. On the other hand, milk is well known to contain only minute amounts of iron, and the deficiency may be felt by infants maintained too long at the breast, or upon an exclusive milk diet.

Actual disease, however, follows only when the qualitative errors in diet are too pronounced for their occurrence to be other than very rare in a country like our own. It is important that it should be recognized in medical practice that deficiency is relative, and that dietaries may be consumed which, while not leading to conditions recognized as definite disease, may, because of their failure in specificity rather than quantity, involve impairment of health and diminished resistance

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to infection. Such cases may be rare among adults though the close observer will find them readily enough, being usually in danger, however, of ascribing the symptoms to constitutional defects. They are certainly by no means rare in children. Indeed, if the significance of these newer conceptions concerning diet is to be properly appraised it should be remembered that the younger the individual the greater the apparent need for vitamins and other food items with specific qualities.

It is surely, however, of practical importance to know that when the infant is at the breast the adequacy of its supply of vitamins depends upon the nature of its mother's diet, and that when cows' milk takes the place of human milk there is equal dependence upon the right feeding of the animal.

If, in conclusion, the whole question of qualitative errors in diet be broadly reviewed from a practical standpoint, it is fair to say that, in this country, adult individuals living at a satisfactory economic level are usually protected by their habits from specific deficiencies. When purchasing power is restricted there may be deficiencies of the kind under consideration even when the food obtained is sufficient in amount. This is notably the case in respect to animal fats and the important vitamins associated with them, but also in respect to fresh fruits or salads as a source of the antiscorbutic factor. The former omission is a question of cost, the latter is perhaps rather a matter of habit.

At all economic levels the diet of the child is more liable to errors, and the errors have a much greater significance. Yet even here it is interesting to note that the deficiencies chiefly to be feared are those of the vitamins associated with fats, and (when ignorance exists) that of the antiscorbutic factor. Against these, high-grade milk is fully protective, and when they are put out of court other possibilities seldom need consideration.

Recent Work on the Chemistry of the Vitamins.

By ARTHUR HARDEN, F R S

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EVER since the discovery of the existence and importance of the vitamins efforts have been made to isolate them and ascertain their chemical nature. Failure has so far been the result, and these mysterious substances must be added to the large group of biochemical agents, comprising among its members the enzymes and most of the hormones, which, although producing the most obvious and vitally important effects in animal and vegetable organisms, have persistently defied chemical identification.

There have not been wanting alarms and excursions in the form of announcements of the isolation of this or that vitamin, but none of these products has emerged as refined gold from the critical furnace.

Vitamin-B—Vitamin-B, the most stable towards oxidation of the four vitamins so far definitely discriminated, was the first in the field, and the story of the early attempts to isolate it is already ancient history. The gallant attempt of Funk in 1911, executed with great skill and determination by purely chemical methods, led to crystalline products of high activity, which were nitrogenous substances—one afterwards recognized as nicotinic acid—most probably simply contaminated with the active principle. Incidentally it led also to the name vitamin, which, in its slightly modified form of vitamin, appears to be finding general

acceptance. The later attempts of Moore and his colleagues (toruline), and the much more elaborate experiments of Suzuki and his co-workers in Japan—also by chemical means—were no more satisfactory than those of Funk. The active principle (oryzanine) was undoubtedly concentrated by Suzuki about five hundred times (from rice-bran), but the alleged individuality of his products has not been accepted.

More recently Seidell, in America, has made use of adsorption methods for the attempted isolation of the vitamin. Yeast extract is treated with fuller's earth, which adsorbs the vitamin, yielding an "activated solid," which can be washed with water and alcohol. This serves as a starting-point for the preparation of more highly concentrated material, the vitamin fraction being extracted by baryta, and finally obtained as a picrate, melting at 160° . To the active substance Seidell ascribes the formula $C_6H_{18}O_2N_3$. A dose of 1 mg. per day protects pigeons from polyneuritis. Several investigators have followed the lines indicated by Seidell's experiments, and have employed adsorbents. Thus Kinnorsley and Peters in Oxford have used charcoal and continued the fractionation by the aid of alcohol, finally arriving at a material which is soluble in alcohol, and of which a dose of 0.34 mg. cures polyneuritic pigeons for four days. As doses of this material which protected against polyneuritis for many days did not cause increase in weight of pigeons after cure of the polyneuritic symptoms, these authors suggest that vitamin-B may consist of two factors, a suggestion which has been previously made on other grounds.

Some confirmation of this view is to be found in the work of Levene and van der Hoeven, who by the combined use of chemical methods and adsorbents have also obtained highly potent preparations, the active agent of which is precipitable by baryta and by alcohol, whereas it will be remembered that the pro-

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duct of Kinnersley and Peters is soluble in alcohol. Levene and his colleagues start with a preparation made by fractionally precipitating yeast extract with alcohol (Osborne and Wakeman), and by successive precipitations with basic lead acetate and baryta, followed by adsorption by means of silica gel, extraction of the gel first with acid and then with alkali (p_H 9), and precipitation by alcohol, finally obtain a material of which 0.1 mg. per day (containing 0.015 mg. of nitrogen) is sufficient for the daily needs of a rat. According to Emmett and Peacock this dose for a rat corresponds with about 0.3 mg. for the maintenance of a pigeon, a result of the same order as that obtained by Kinnersley and Peters for the curative dose for a pigeon.

The last-named workers suggest that their product is still very complex, and that the curative dose of the pure vitamin may be of the order of 0.001 mg. per day, and Levene and van der Hoeven also regard their most active product as a complex mixture. Seidell, on the other hand, does not think that the activity of his product is due to impurities.

The exact relation between these three products is not clear, as different methods of testing have been used in each case, but it is obvious that finality in this question is still far distant.

Under these circumstances it is not easy to ascribe definite chemical properties to the vitamin. It appears, however, that it is not inactivated by the action of nitrous acid, is affected with difficulty by acids, more readily by alkalies, and is not readily oxidised.

Yeast Growth Stimulant (Bios).—Closely associated in yeast with vitamin-B, the bios of Wildier is considered by some investigators to be a vitamin. Too little is as yet known about the matter to warrant this conclusion, and this interesting substance is, therefore, not discussed in this article.

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Vitamin-C.—The first step in the purification and concentration of the antiscorbutic vitamin was the removal of the citric acid by precipitation as calcium citrate (Harden and Zilva). As this operation could be carried out without any loss of activity, clear proof that the citric acid was not the active principle was afforded. Incidentally, the basis on which limes had been purchased for the "lime juice" of the British Navy was shown to be entirely fallacious. Further advance was only rendered possible by the recognition (Zilva) that the vitamin was very readily inactivated by oxidation by atmospheric oxygen, especially when in alkaline solution. This imposes a very serious experimental handicap, as all operations have to be conducted as far as possible in absence of oxygen. The course of purification now adopted by Zilva, to whom the work on the isolation and properties of this vitamin is chiefly due, and to whom I am indebted for some unpublished information, is to remove the sugar of the juice (invert sugar) by fermentation with yeast, and then to add basic lead acetate, which precipitates the vitamin along with other constituents of the juice. The precipitate is washed and decomposed, and the resulting solution treated with normal lead acetate, which leaves the vitamin in solution, but precipitates various other constituents of the juice. The excess of lead is removed (by magnesium sulphate), the solution precipitated by alcohol, and the filtrate reconcentrated, and again precipitated by alcohol. The final solution, when made up to the volume of the original lemon juice, has practically the same antiscorbutic power as the original juice, but instead of 9 per cent, contains only about 0.01 per cent. of solid matter, the great bulk of which is almost certainly made up of organic acids without any activity. The protective daily dose for a guinea pig or monkey (1.5 c.cm.) therefore contains only 0.15 mg. of solid

matter A small amount of nitrogenous material is present, but there is no evidence on which to decide whether or not the vitamin itself contains nitrogen.

The solution has powerful reducing properties, but these seem to be independent of the active principle, since the reducing properties are destroyed at a different rate from the antiscorbutic principle. Diffusion experiments show that the vitamin behaves as though it had a molecular weight approximating to that of a hexose. It is soluble even in absolute alcohol and, as already mentioned, is precipitated by basic lead acetate, but not by the normal salt.

Vitamin-A.—For the attempted isolation of vitamin-A the two key observations are, firstly, that the vitamin is liable to oxidation, both by atmospheric oxygen, especially at high temperatures (Drummond; Hopkins, Zilva), and by ordinary oxidizing agents, and, secondly, that, when the fats with which it occurs are saponified, the vitamin is found in the unsaponifiable matter (Steenbock and Boutwell, 1920). The isolation of the vitamin from the unsaponifiable matter of cod-liver oil (0.8 per cent.) has been attempted simultaneously, and by very similar methods, in Japan by Takahashi and his colleagues, and in England by Drummond, Channon and Coward. The unsaponifiable matter contains about 50 per cent. of cholesterol, and when this is removed by crystallization and precipitation with digitonin, the whole of the activity remains in the residue. This confirms a previous observation (Drummond) that cholesterol is inactive. The active residue appears to be a complex mixture, in which have been found a saturated and several unsaturated alcohols, and one or more unsaturated hydrocarbons. The Japanese investigators claim to have isolated by fractional distillation under a low pressure an unsaturated alcohol, $C_{27}H_{46}O_2$, which they regard as the vitamin, and term "Bios-term." The English workers, however, are strongly

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of the opinion that no definite active compound has been isolated in this way, and regard the product of the Japanese workers as a complex mixture. Such constituents as they have succeeded in isolating from the mixture left after the removal of the cholesterol have proved to be inactive. Here the matter at present rests. Both sets of investigators have concentrated the vitamin-A of cod-liver oil about one hundred times. The most active preparations are those of the Japanese workers, of which a daily dose of 0.01—0.005 mg. suffices for the needs of a growing rat.

An interesting feature which has arisen in the course of this work is that several brilliant colour reactions have been found (Drummond and Watson) which are given by the active material, the intensity of which seems to run parallel to the activity of the preparation. Whether these are actually reactions of the vitamin itself or of some closely associated substance is not yet certain, but the question is one of great importance, as a chemical test for this, or, indeed, for any vitamin, would enormously extend the possibilities of research, and is, in fact, the great desideratum in this class of work.

Vitamin-D. — The antirachitic vitamin, usually termed vitamin-D (although Funk gives this name to the yeast-growth stimulant), which has some effect in promoting growth and is essential for the proper calcification of the bones, stands in a different position from the others, as it has been found possible to obtain it artificially by the irradiation of cholesterol with ultra-violet light.

This observation may be regarded as the culmination of several distinct lines of research carried out by different investigators. On the one hand these led to the realization that McCollum's "fat-soluble" vitamin was a mixture of at least two distinct principles—the growth-promoting and anti-xerophthalmic vitamin-A, and the antirachitic and, to a minor extent,

also growth-promoting vitamin-D. These differ in their resistance to oxidation, and in their distribution in the animal and vegetable kingdoms, but both agree in passing into the unsaponifiable fraction when the fat in which they occur is hydrolysed, and in being readily separable from the cholesterol of this fraction. On the other hand, the beneficial result in rickets of exposure to ultra-violet light led to the interesting discovery, made almost simultaneously by Hess and by Steenbock in America, that many food materials, and among them fats, acquire antirachitic properties when they are exposed to ultra-violet radiation. It was then discovered, independently by several workers, that the carriers of these newly-acquired properties were the sterols of the fats, and that these substances in the purified condition acquired antirachitic properties under the same treatment (Steenbock and Black, Hess and his colleagues, Rosenheim and Webster; Drummond, Rosenheim, and Coward). This fact has now been repeatedly confirmed, and the use of irradiated cholesterol as a source of antirachitic vitamin in a diet has been adopted as a routine procedure in some laboratories.

There seems to be little doubt that the beneficial effects produced by irradiation of animals is due to the activation of cholesterol contained in the skin and other tissues. Direct experiment has shown, for example, that skin can be endowed with antirachitic properties by irradiation. Moreover, the activation of all these substances is effected by rays of the same wave length as are efficacious when used for the direct irradiation of the living animal.

Scarcely anything is known as to the nature of the change produced in the cholesterol. It is by no means of a transient kind, as samples of activated oils have preserved their activity for as long as six months. According to Drummond and his colleagues the

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irradiated product also gives colour reactions which differ both from those of cholesterol itself and from those ascribed by them to vitamin-A.

Activated cholesterol has, moreover, been shown to have less adsorptive power in the ultra-violet region than the inactive material. The dihydro-derivative obtained by the reduction of cholesterol is not susceptible of activation by irradiation, and the same is true for the reduction product of the phytosterol of vegetable oils. This seems to point to the unsaturated linkage, known to exist in the cholesterol molecule, as the seat of the change produced by irradiation.

The foregoing is certainly one of the most important and far-reaching observations made on the chemistry of the vitamins, and its further development cannot fail to be of surpassing interest.

CONCLUSION.

The present position with regard to this interesting question is that the vitamins, A, B, and C, have been obtained in highly concentrated form—from 100 to 900 times more potent than in their most active natural sources. Moreover, this concentration has been effected without any very serious loss. This is notably the case with vitamin-C. There is, therefore, up to this stage, no question of the potency disappearing under the hands of the investigator, whether from inherent instability of the compound, or from the removal of adjuvants during the process of purification. There is as yet no experimental evidence in favour of Baly's interesting suggestion that vitamins are energized forms of ordinary materials, to which they revert by loss of the extra energy. The difficulties of further advance lie in the vanishingly small absolute amounts of the vitamins which are present in natural sources and in the complication of the mixture of substances with which they are associated. Neither of these should prove insuperable to modern methods of investigation.

(Owing to the continuous demand for copies of the following article, which appeared in our issue for January, 1925—now completely out of print—it has been found necessary to include it in this number, the author having brought the subject up-to-date.)

Some Practical Considerations on the Vitamin Problem in Nutrition.

By R H A PLIMMER, D Sc

Professor of Chemistry in the University of London at St Thomas's Hospital Medical School

THE *Composition of Food*—Until a few years ago food was regarded as consisting of five essential constituents. carbohydrate, fat, protein, mineral salts, and water, which provided all the material for growth, heat, and energy. Protein was known to be essential for growth and for replacing loss by “wear and tear.” The value of protein was estimated in terms of nitrogen, and one kind of protein was considered as good as another. Fat and carbohydrate were valued solely as providers of heat and energy. The need for mineral salts was recognized, iron for hæmoglobin, lime and phosphates for bone and teeth. Attention was chiefly directed to the energy requirements of the body. Calorimetry became an exact science—indeed, certain schools of physiology made it the be-all and end-all of nutrition. This obsession with calories still blinds many reputed authorities to the advances which have been made in the study of nutrition during the last fifteen years. During the war dietaries for the fighting forces, for prisoners-of-war, and for civilian populations were planned on the calorie basis. In many instances nutritional disaster followed, causing much ill-health and loss of life which would have been avoided if those responsible for devising the diets had applied the results of modern scientific work.

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The failure of the pure caloric system in practice necessitated the adoption of recent discoveries, with results that were entirely beneficial.

Modern work upon food and nutrition clearly demonstrated that in addition to the above-mentioned food constituents, three quite distinct accessory food factors or vitamins must be present to make the diet satisfactory and health giving *.

For convenience, since the chemical nature of the vitamins is not known, they are called A, B, and C. There is also some evidence that other unknowns are necessary, and these have been called D, E, etc. Many people are still sceptical of the existence of vitamins because they have not yet been isolated. Those who have found it difficult to accept their existence have assigned to salts, organic and inorganic, an exalted significance in nutrition. They have, in fact, invested salts with all the properties of all the vitamins. There can, however, be no question that vitamins are not salts. The vitamins are unstable compounds destroyed by processes which have no effect upon salts. For example, tinned or dried fruits and vegetables have lost their special nutritive value, vitamin-C, and cannot prevent scurvy, although the salts contained in them are unaltered by the processes of tinning or drying. Very active preparations of each of the three vitamins have been made. The isolation of the antirachitic vitamin is reported from

* The history of the discovery and of the growth of knowledge of the vitamins is summarized in technical form in Report No. 38 of the Medical Research Committee, and in a more popular form in "Vitamins and the Choice of Food," by V. G. and R. H. A. Plimmer. Colonel Robert McCarrison, I.M.S., in "Studies in Deficiency Disease," has dealt with the pathology of lesions due to lack of vitamins and the clinical application of recent nutritional discoveries. Special studies have been made of "Scurvy, Past and Present," by Dr. Alfred F. Hess, and of "Rickets," by Professor E. Mellanby, and by Dr. Harnette Chick and others, published in the Medical Research Committee Reports, Nos. 61 and 77.

Japan. There can be as little doubt of their existence as there is of an active principle in the thyroid gland or of the insulin in the pancreas. The chemical constitution of thyroxin and of insulin has yet to be determined. It will be remembered that adrenalin was only isolated long after the activity of the suprarenal gland was discovered. The existence of enzymes, toxins, and anti-toxins is not disputed, although their chemical nature is quite unknown. In the same way the A, B, and C vitamins must be accepted as three distinct chemical entities.

The inclusion of the vitamins does not alter the calorie requirements of the body under different conditions. Calories, protein, and vitamins are all wanted. Man cannot live on calories alone.

A Balanced Diet—The expression a "square meal" is often used. This idea may be conveniently adapted to express a balanced diet in diagrammatic form. If each meal, or at any rate the day's food, is planned to comply with this standard, then the whole diet automatically becomes balanced. In the diagram (Fig. 1) a circle represents the proximal principles, carbohydrate, fat, protein, mineral salts, and water. To square the circle four corners must be added. These corners represent vitamins A, B, C, and "good" protein, A, B, C, and P respectively in the diagram. The size of the circle may be conceived as varying with the individual appetite which corresponds approximately with the calorie requirements. The foods which supply each vitamin can be arranged schematically, so it can be seen at a glance what items must be included to fill each corner.

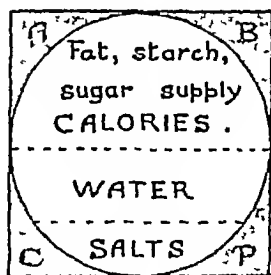


FIG 1 A balanced diet.

Vitamin-A is most abundant in animal fats and

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green vegetables. Vitamin-B is most abundant in whole cereals, nuts, and other seeds, eggs, the internal organs of animals, and to a lesser extent in root vegetables. Vitamin-C is most abundant in fresh juicy fruits and green vegetables.

"GOOD" FOODS, SUPPLYING VITAMINS *

<p>VITAMIN-A</p> <p>Cod-liver oil +++ Butter ++ Egg yolk ++ Liver ++ Beef fat ++ Heart + Mutton fat + Milk + Herring, mackerel + Green vegetables ++</p>	<p>VITAMIN-B</p> <p>Wholemeal cereal products ++ Dried peas and beans, lentils ++ Egg yolk ++ Liver, heart, pancreas, brain, kidney ++ Nuts ++ Yeast +++ Yeast extract (marmite), +++ Root vegetables + Potato +</p>
<p>VITAMIN-C</p> <p>Fresh fruits, especially orange, lemon, grape fruit, tangerine, tomato, +++ Raspberry, blackberry ++ Peach ++ Other fruits mostly + Raw green vegetables +++ Cooked green vegetables (if cooked for short time) + Potatoes + Swede turnips +</p>	<p>"GOOD" PROTEIN</p> <p>Meat Egg Milk and cheese Fish</p>

* +++=Very good ++=Good +=Fairly good.

Some fruits and vegetables contain little or no vitamin-C grapes, carrots (unless very young), beetroot, cauliflower, white turnip, jams, bottled, tinned or pickled fruits and vegetables should be regarded as lacking vitamin-C

A comparison may with advantage be made with similar kinds of foods which do not contain vitamins or merely traces of them.—

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"BAD" FOODS, NOT SUPPLYING VITAMINS

FATS	CARBOHYDRATES	PROTEIN
<i>Vegetable oils and fats</i> do not contain vitamin-A	<i>Highly-milled cereals</i> such as	<i>Flesh</i> of animals are poor in vitamins-B and C
<i>Margarine</i> made entirely from vegetable fats is therefore poor in this vitamin. Most margarines contain some animal fat	White rice	<i>Pork and white fish</i> also lack vitamin-A
<i>Lard</i>	White wheaten flour	
<i>Bacon fat</i>	Cornflour	MISCELLANEOUS
<i>Pork fat</i>	Pearl barley	Bananas
	<i>Sago</i>	Tea, coffee, chocolate
	<i>Tapioca</i>	Beer
	<i>Sugar</i>	Canned and sterilized foods
	<i>Syrup, treacle</i>	
	<i>Custard powders</i>	

A study of the tables of "good" and "bad" foods shows that most natural animal fats and cereals function as vehicles of vitamins, and their value may be spoiled by commercial processes. Vitamins are consumed at the same time as calories, if foods are chosen from the "good" list. Foods from the "bad" list supply calories and sometimes "good" protein, but need to be supplemented by concentrated vitamin foods, such as cod-liver oil or butter for A, yeast extract for B, and orange juice for C. A diet composed of a mixture of "good" and "bad" together must be carefully scrutinized as it may fail to provide *enough* vitamins to maintain good health. As in the case of a diet chosen from the "bad" list, it is safer to supplement it, especially if it contains much white cereals and sugar.

Various Types of Wrong Diets — The diagram of a "square meal" can be modified to illustrate every variety of improper diet, from those causing the specific deficiency diseases to the generally unbalanced diets such as are commonly consumed. The corners are best considered individually.

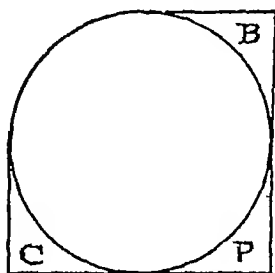


FIG 2 Absence of vitamin - A causes failure of growth keratomalacia

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Absence of Vitamin-A.—The corner A may be missing. The absence of vitamin-A causes cessation of growth, wasting, anæmia, and lowered resistance to infections. Keratomalacia usually develops. Bronchitis, pneumonia, and cataract are other infective conditions favoured by this type of deficient diet. Vitamin-A is less important to the adult than the other vitamins, and small amounts of foods containing it suffice to maintain health. Its chief function in adult life appears to be the strengthening of resistance to infection.

Shortage of Vitamin-A.—As distinct from absence, shortage of vitamin-A, or of an antirachitic vitamin of similar distribution, is connected with the development of rickets. There is enough vitamin in the food to produce

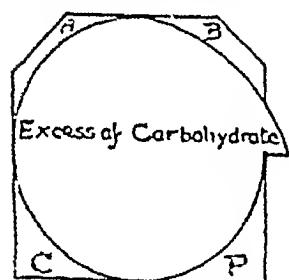


FIG 3 Shortage of vitamin-A is the controlling factor in the causation of rickets. There is usually also a shortage of vitamin-B and an excess of carbohydrate

growth at a normal rate, but the bones and teeth are improperly calcified. The deposition in the bones of the lime salts derived from the food depends upon an adequate supply of this vitamin. A study of rickets-producing diets shows a lack of balance in other respects. Invariably there is also a shortage of vitamin-B, and generally a preponderance of carbohydrate. The specific curative effect of cod-liver oil, the

foodstuff richest in vitamin-A, suggests that a shortage of this vitamin is the controlling factor in the development of rickets, but Dr. Alfred Hess has shown that less is required if the diet is rightly adjusted in other respects. Sunlight has a beneficial effect upon rickets, and apparently diminishes the in-

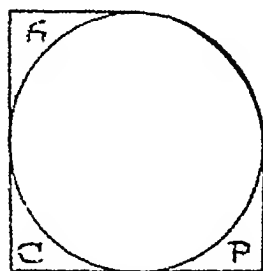


FIG 4 Absence of vitamin-B causes beri-beri.

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fant's requirements for this vitamin. Sunlight has recently been discovered to produce antirachitic power in fats devoid of vitamin-A. The constituent which becomes activated has been found to be cholesterol.

Absence of Vitamin-B.—The corner B may be missing. Diets in which vitamin-B is absent lead to the development of beri-beri after three months.

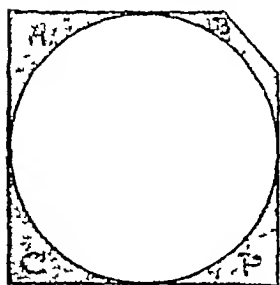


FIG 5 Shortage of vitamin-B causes gastro-intestinal troubles.

Shortage of Vitamin-B —Before the symptoms of beri-beri appear there is a period of ill-health in which occur common symptoms met with every day in medical practice. The first signs are loss of appetite, or there is a depraved appetite in which experimental animals are observed to eat their faeces, and, in the case of birds, their feathers and eggs. Weak-

ness, loss of weight, lack of vigour follow, together with anæmia, a tendency to œdema, sub-normal temperature, and cardio-vascular depression. Later, gastro-intestinal derangements appear—indigestion, constipation, colitis, appendicitis, finally, there are symptoms due to the malnutrition of the nervous system. The onset of these symptoms varies according to the degree of shortage of vitamin-B. The greater the shortage the sooner they appear. If the shortage is slight the nervous symptoms may never appear, and the organism suffers only from dyspepsia, constipation, and other intestinal troubles. The body is thus weakened and offers no resistance to invading micro-organisms, or to larger parasites like worms.

Absence of Vitamin-C.—The corner C may be missing

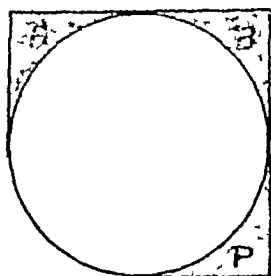


FIG 6 Absence of vitamin-C causes scurvy

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Scurvy develops after four months upon a diet lacking vitamin-C.

Shortage of Vitamin-C. — Before definite symptoms of scurvy appear there is a period of ill-health characterized by certain symptoms which may also be looked for in those who habitually take too little vitamin-C, though they get enough to prevent acute scurvy. These symptoms are a sallow, muddy complexion, loss of energy, fleeting pains in the joints and limbs, especially in the legs, usually mistaken for rheumatism. So-called rheumatism in infants and young children has often been proved to be due to insufficient vitamin-C, and is really scurvy, which in its severer form is known as Barlow's disease or as scurvy-rickets.

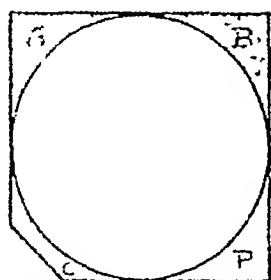


FIG 7. Shortage of vitamin-C causes ill-health and pruns in the limbs

"Good" Protein — The corner P represents protein supplying all the essential amino acids. The biological value of protein cannot be reckoned in terms of nitrogen, but according to its amino acid content. There are some twenty amino acids in the protein of the animal body. "Good" proteins for food are those which supply all the essential amino acids in suitable proportions. The best proteins are derived from animal

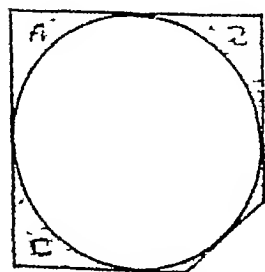


FIG 8 Absence of "good" protein causes pellagra

tissues, such as meat, milk, cheese, eggs, fish. A small quantity of animal protein daily is all that is needed, an excess, as is well known, is harmful. The proteins of plant tissues are "poor," because they contain unnecessarily large amounts of some amino acids and little or none of others. A diet lacking

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some essential amino acids is associated with the development of the disease pellagra, the prevention of which has been an acute problem in the Southern United States, in Italy, and other parts of the world, where little animal protein is eaten by the poorer classes.

Shortage of all the Vitamins.—In this country the definite deficiency diseases—beri-beri, scurvy, and pellagra—are prevented by the ordinary mixed diet. This does not mean that our diet approximates to the standard of “squareness,” nor that we escape the consequences of our errors. [Larger and smaller errors in various directions obscure the clear-cut picture of any one definite deficiency disease, but cause a host of small ailments and many cases of chronic illness. Experiment has shown that the greater the shortage of any vitamin the sooner does the deficiency disease arise. With slight shortages of the various vitamins characteristic symptoms take a long time in appearing. In most cases the first sign of illness is loss of appetite, followed by digestive disturbance. Animals may have stoppage of the gut, gastric or duodenal ulcer, or die of appendicitis or other troubles before the typical symptoms of the deficiency disease are shown. During the war the slow healing of wounds was found to be associated with shortage of vitamin-C. Heart and digestive troubles are caused by shortage of vitamin-B. Under all variations of vitamin shortage experimental animals are more susceptible to infections of all kinds. Animals fed on vitamin poor diets have succumbed to epidemics of infectious disease which have not attacked other animals kept side by side with them, but fed on food containing enough of all the vitamins. Details of these experiments cannot be entered into here, but they all prove how intimately health depends upon a supply of food containing plenty of all the vitamins. Lack of cleanliness, bad housing, and confinement do not produce disease in properly fed animals

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Two common types of deficient diets may be picked out for special consideration. The type of wrong diet common amongst the richer classes shows an excess of fat, sugar and protein, and of vitamin-A. The use of white bread, white flour, and other white cereals, and of too much sugar, upset the balance of vitamin-B. This diet is constipating, and, there is reason to believe, cancer producing.

Contrasted with this type is the type of diet common amongst the poorer classes. In this case potatoes are

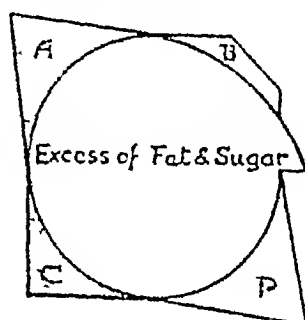


FIG 9 Deficient diet of the richer classes. excess of fat, sugar, protein; shortage of vitamin-B

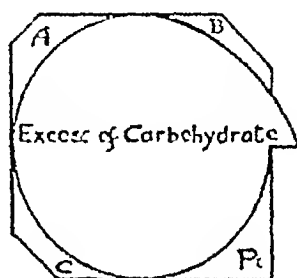


FIG 10 Deficient diet of the poorer classes. excess of starch and sugar, a shortage of all the vitamins, especially of vitamin-B

practically the only source of vitamins-B and -C. The food consists very largely of white bread, varied with small amounts of cheese, bacon, meat, fish, etc., and usually there is a good deal of sugar. Many examples of such diets are given in Rowntree's study of "Poverty." There is an excess of carbohydrate and a shortage of all the vitamins. The protein supply is fairly good, except amongst the very poor. This diet is also constipating; it lowers the resistance to infections such as tubercle, influenza, pneumonia

Fig. 10 is also illustrative of the diet of a bottle-fed baby fed on milk and water thickened with a white-floury or malted food.

The preponderance of carbohydrate unbalanced by

vitamin-B is a fault common to the food of both rich and poor, and may have some connection with the occurrence of diabetes.

The Quantity of Vitamins Needed.—In the absence of chemical knowledge of the vitamins there are consequently no exact data of the amounts of each of the vitamins in the various foodstuffs, nor of the amounts required by the body for the maintenance of health. A great deal of work has, however, been carried out to ascertain how much of the several vitamins, as reckoned in terms of foodstuffs, must be taken to prevent the characteristic deficiency diseases. The amounts thus determined are the minimal, and it is likely that they may be larger, since the experiments were of comparatively short duration. In all cases the quantities were larger than might be expected, especially as some of the original experiments gave the idea that only very small quantities were needed. It is commonly believed that the ordinary mixed diet must provide plenty of vitamins, but this is incorrect.

The Quantity of Vitamin-C.—The most complete series of experiments upon quantitative vitamin requirements are those with vitamin-C carried out by Dr. Harriette Chick and her colleagues at the Lister Institute. The guinea-pig was used as the experimental animal, but in some cases monkeys were also used. A large number of fruits and vegetables were tested, as well as the effect of heat, drying, and the influence of chemicals. The experiments were designed to be of a practical nature. Many were made during the war to find out the most suitable antiscorbutic for armies operating far from a base. Others were devised to ascertain the effect upon the vitamin-C in milk of the various commercial and domestic processes to which it is subjected.

The data obtained with guinea-pigs may be thought inapplicable to man, but they can be compared with

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an old naval test on sailors. On long voyages scurvy was not prevented by an allowance of $\frac{2}{3}$ oz. of lemon juice per day, but no cases were observed with an allowance of 1 oz. This figure makes it possible to recalculate the data obtained with guinea-pigs in terms of man's requirements, as summarized in the following table:—

FOODSTUFF		GUINEA-PIG	MONKEY	MAN.
Lemon juice or orange juice		1 5 c cm	1 5 c cm	1 0 oz dail
Cabbage (raw)	-	Found		Calculated
Cabbage, cooked $\frac{1}{2}$ hour	-	1 0 gm		0 6 oz
Swede turnip juice	-	20 0 gm	—	13 0 oz
	-	2 5 c cm	—	1 6 oz

For other data, see books on "Vitamins and the Choice of Food," Plummer, page 61, and "Food and Health," Plummer, p 17

The Quantity of Vitamin-B—The quantity of vitamin-B which is required has been found to be related to the food consumption. This relationship was first indicated by the work of Braddon and Cooper. Plummer and Rosedale found it necessary to balance the carbohydrate of the diet by vitamin-B in order to rear chicks to maturity. Their further work has shown that not only the carbohydrate, but also the fat and protein must each be balanced by vitamin-B. In other words, the ratio vitamin-B / total food must be constant. Using yeast extract, or dried yeast, as source of vitamin-B, chicks on a diet of white rice, fishmeal, and cod-liver oil needed 10 to 12 per cent. in the diet for satisfactory rearing. Pigeons needed rather less, from 8 to 10 per cent, and other birds rather more. Experiments with rats have indicated that at least 4 per cent. must be present in the food. Man's requirement used to be considered the same as the rat's, but a higher figure, approaching that of the bird, is not by any means excluded.

In view of the large amounts of yeast extract needed to balance white flour, it is of great import-

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ance to know the comparative value of the various foods.

Investigations of the comparative amounts of vitamin-B in various articles of food were carried out at the Lister Institute, first by Cooper and later by Chick and Hume, using the pigeon as the test animal. The amount of each foodstuff needed to prevent beri-beri in a pigeon on a constant ration of white rice was determined. The data may be given briefly :—

	Grams per day
Yeast extract (marmite) - - - -	1.0
Wheat germ, free from bran - - - -	1.5
Pressed yeast - - - - -	2.5
Lentils, whole seed - - - - -	3.0
Egg yolk - - - - -	3.0
Ox liver - - - - -	3.0
Peas - - - - -	5.0
Ox heart - - - - -	5.0
Ox brain - - - - -	6.0
Sheep brain - - - - -	12.0
Beef muscle - - - - -	20.0
Cow's milk, more than - - - -	35.0

The comparative vitamin-B content of various foods is being investigated by Plummer and Rosedale. The amount of food containing vitamin-B that must be present in a diet otherwise consisting of white rice or white flour and 5 per cent. fishmeal, to ensure long maintenance and reproduction, is being determined. Some of the figures are the following :—

	Per cent
Oatmeal - - - - -	95
Wholemeal flour - - - - -	75
Whole barley - - - - -	65
Whole rye - - - - -	55
Wheat germ - - - - -	8-10
Yeast extract - - - - -	8-10
Dried yeast - - - - -	8-10
Dried peas - - - - -	40
Boiled potato - - - - -	90

Sufficient vitamin-B in the diet is thus only given if it consist of 95 per cent. oatmeal, or 75 per cent. whole wheat flour. The corresponding figures in the case of

rats would be approximately 50 per cent. whole wheat, 30 per cent. rye, 75 per cent. oatmeal.

These data are of significance when we consider that the average diet consists of two-thirds carbohydrate

The Quantity of Vitamin-A.—Experiments of the same kind as those above do not appear to have been made with vitamin-A. The long series by E. Mellanby with dogs have clearly shown that 10 c. cm. of cod-liver oil in the daily food always prevented rickets. The food consisted mainly of bread, about 150 to 180 grams daily, so that 5 per cent. in the food is the approximate requirement for dogs. McCollum prevented rickets in rats with about 3 per cent. of cod-liver oil daily. Drummond found that a few drops of cod-liver oil was ample to promote growth of rats. Zilva, Golding, and Drummond cured rickets in pigs by the daily addition of $\frac{1}{2}$ oz. (=1.25 per cent. of the total food); the basal diet providing enough A to promote growth but not enough to prevent rickets. In the case of chickens Plummer and Rosedale found 1 per cent. of cod-liver oil was enough to ensure normal growth. It is thus very difficult to state a minimal quantity of cod-liver oil for incorporation in the food of animals.

A rough comparison of the vitamin-A value of different fats has been given by Drummond: beef fat was four-fifths, and mutton fat one-fifth as good as butter. Zilva estimated cod-liver oil as 250 times as rich as butter in vitamin-A. The fact that the amount of vitamin-A in animal fats varies according to the food of the animals makes it difficult to determine the comparative values of fats as a source of vitamin-A.

The Variability in the Vitamin Content of Certain Foods.—Animals cannot synthesize vitamins, but derive them directly or indirectly from plant tissues. On this account the vitamin value of milk varies greatly according to the time of year. Milk, cream, and butter from cows at pasture in the summer are far richer in

vitamin-A than from stall-fed cows in winter. The fat content of milk is higher in winter than in summer, but the amount of fat bears no constant ratio to the amount of vitamin-A. It has been shown that the quantities of vitamins-B and -C also vary according to the food of the cows. Consequently, nursing mothers should eat plenty of the vitamin-containing foods.

Destruction and Loss of Vitamins.—Vitamins are lost from the food by the various processes used in its preparation. Each vitamin gets lost or destroyed in a different way. Vitamin-A is very sensitive to oxidation, especially at high temperatures. Thus vitamin-A in milk withstands sterilization in closed vessels, but it would be destroyed in fat used for frying as it is then exposed to heat and air. It is also destroyed by hydrogenation, the process used to harden oils for margarine.

Vitamin-B is stable to heat except at high pressure, as in canning meat, etc. Through its solubility it is washed away from vegetables cooked in an excess of water. It is therefore better to steam vegetables. The most serious loss of vitamin-B occurs in the preparation of white cereals. The wholemeal contains ample vitamin-B. With two-thirds of the nation's food consisting of white cereal foods and sugar, it is difficult to see how this loss of vitamin-B can be made good by the remaining one-third of the diet, as few foods contain enough vitamin-B to balance the deficiency in white cereals.

Vitamin-C is the most easily destroyed. The antiscorbutic properties of fruits and vegetables are lost by drying, heating, oxidation, such as occur in the ordinary domestic and commercial processes. The quantity in cabbage and potato is diminished by boiling for twenty minutes, and altogether lost by long, slow stewing. Heating twice is also totally destructive, as in the boiling of already pasteurized milk. Vitamin-C is

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quickly destroyed by alkali as in the cooking of vegetables with soda to preserve their green colour. Infantile scurvy has been caused by the use of citrated milk. Sodium bicarbonate is equally injurious.

Roughage and Vitamin-B.—Foodstuffs, especially those of vegetable origin, contain, in addition to the five essential constituents, different amounts of cellulose, or fibre, commonly termed roughage. The fibre, not being digestible, is generally considered to play no direct part in nutrition, but is believed to aid peristalsis and evacuation of the bowel. It is for this reason that filter paper, or agar, is added to the food in many animal experiments. The material thus acts as bulk. Plummer and Rosedale have kept birds and also rats* for long periods, in some cases for over two years, in which time they had reproduced, on diets containing a minimum of cellulose. The long maintenance and reproduction were only possible if the diet contained *sufficient* vitamin-B. Other birds on similar diets, but with too little vitamin-B, were observed to suffer from the early symptoms of polyneuritis, such as constipation, and were cured by a dose of yeast extract. It was noticed that these animals emptied their bowels after the dosage with vitamin-B before the cure took place. Cellulose in the ordinary diet of man is derived chiefly from the bran of the grain. Bran contains vitamin-B. The assumption may, therefore, be made that one of the effects of roughage is the introduction in the food of vitamin-B, which aids peristalsis.

This is not likely to be the only explanation of the action of roughage. In the absence of vitamin-B, birds suffer from stagnation of food in the gut. Putrefaction then occurs, with the production of various toxins. It is suggested that beri-beri is due to the absorption over long periods of small quantities of a toxin, derived from

* Not yet published

the decomposing protein of the food in the stagnant gut, or even from damaged intestinal wall. Cellulose is a good absorbent of dyes and other chemical substances, so that it may serve as an absorbent of the toxins produced during the time of constipation, and thus prevent their harmful effect. China clay and charcoal, as used therapeutically, probably act in this way; paraffin may be a solvent of the toxins. In all cases, the toxin is removed and prevented from being absorbed into the blood. Roughage would thus appear to be unnecessary in a diet with sufficient vitamin-B, but, in a diet containing a shortage, it may act as an absorber of toxins arising from constipation and prevent their introduction into the circulation.

The same explanation may be given for the beneficial action of charcoal and chalk, which are so often used in the rearing of pigs. Roughage could serve further by forming a layer of impermeable material along the wall of the intestine preventing the absorption of toxin.

The vitamin problem is of far greater importance than is generally realized. The harm done by forty years of wrong feeding can never be entirely repaired by belated attention to the need for vitamins—the structural damage having gone too far. The use of vitamin-containing foods may prevent the damage from getting worse. The vitamin question should be first attended to in the bringing-up of infants and young children. Day-old babies can be given their vitamins in small doses in concentrated form with their milk, if artificially fed, if breast-fed the mother should take additional amounts of the foods rich in vitamins. In this way the foundation will be laid for a sound constitution. Particular attention must be given to vitamins throughout the whole period of growth—in fact, with our present-day habit of eating refined and preserved foods it should never be relaxed at any age

Diet and Health.

By DR M HINDHEDE

Director of the Laboratory for Nutrition Researches in Copenhagen

SINCE 1910, when the Danish State granted me the means which enabled me to devote all my time and energy to the investigation of the problem of nutrition, it has been my purpose especially to inquire into the value of each of the most important Danish foodstuffs. The reason that similar experiments have not hitherto been carried out on a large scale in man is, no doubt, principally because it has been impossible to find persons who could tolerate living solely on single food substances for a long time. In Copenhagen we were particularly fortunate, for my assistant, Mr. Frederik Madsen, who had previously been a strict vegetarian for ten years, had trained himself to live chiefly on bread, porridge, potatoes, and margarine. Moreover, without being a complete vegetarian, I had experimented on myself and my whole family with a somewhat similar diet fifteen years previously. We therefore had no misgivings in putting ourselves on a very one-sided diet, as we thought we could always stop if there were objectionable consequences.

In January, 1912, three persons (M H, F.M., and A.J.) began to live entirely on *potatoes* and vegetable margarine (in summer, with a slight addition of onion to make it more palatable). The experiment was continued for three, eleven, and sixteen months respectively.¹ Both light and very strenuous work were done during the experiment. A.J., who previously had been unable to run a short distance without getting out of breath, trained himself to become an expert runner. In order to be certain of getting down to the protein minimum we tried not only normal potatoes containing

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about 2 per cent protein, but for a long time we ate potatoes which only contained 1·2 per cent protein. Even with this amount protein equilibrium was maintained. The following is an example :

F M Period VII, 2 19 days
Diet 2,560 gm potatoes, 152 gm margarine, 45 gm onions

		N gm	=	Protein * gm	Calories
Food	-	5 06		31 6	3,916
Fæces	-	1 44		9 0	120
Digested	-	3 62		22 6	3,796
Urine	-	3 41		21 3	
Balance	-	-+0 21		+1 3	

* Protein = N \times 6 25

It was thus impossible, even with potatoes which had the least amount of protein, to sink below the protein minimum.

32 gm. potato protein (=23 gm. digestible protein) are quite sufficient for a strong adult man

It will be remembered that the minimum of N in the urine cannot be reached in a few days, it may take weeks. Experiments of short duration, therefore, signify nothing. On potatoes alone it appears to be impossible to get below the minimum, but with the addition of products poor in protein or free from it, like fruit, sugar, and starch, prepared in the form of fruit porridge, the N can be reduced to any required degree; for example :

F M 8 days
Diet 700 gm potatoes, 2,519 gm strawberries, 162 gm starch,
375 gm sugar

		N gm	=	Protein gm	Calories
Food	-	5 19		32 4	4,391
Fæces	-	5 16		32 2	624
Digested	-	0 03		0 2	3,767
Urine	-	2 67		16 7	
Balance	-	--2 64		-16 5	

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Most of the different kinds of fruit contain practically no protein, for what protein there is occurs almost exclusively in the skin and seeds, which are passed quite undigested. Further, fruit seems to accelerate the passage through the intestine (without producing diarrhoea or other trouble), so that absorption of the proteins of the other food substances is diminished. Prunes have quite a similar action to that of strawberries.

This method of decreasing the amount of digestible protein and thereby the N in the urine is very useful. The addition of sugar and starch alone, which many other investigators have resorted to, is unfortunate, owing to the lack of salts and vitamins. These deficiencies vitiate the result.

In our potato experiments we made the discovery² that the potato urine had a striking power of dissolving uric acid. Not only was there no excretion of uric acid, even after cooling, but the urine could dissolve large amounts of added uric acid—seven times its own content—at body temperature. Potatoes thus appear to be an excellent means of ridding the body of uric acid. Perhaps it was, therefore, not altogether fallacious that potato water*—the water in which potatoes are boiled—has been considered to be a good household remedy for gout. Since our results were obtained I have also found that the remedy could be used with success for different gouty lesions. Even old deforming joint lesions can, in certain cases—not in all—be cured.

The case of Dr. Rose is a very instructive example. He was a German doctor who visited the laboratory during our potato experiments in 1912. His interest

* It should be stated that our experimental persons always drank the potato water as well. This is very important, as a large quantity of salts and vitamins pass into the water. The potatoes are thinly peeled before boiling. It is difficult to wash them so clean that the cooking water tastes nice.

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in the subject was excited, and on returning home he carried out a nine months' experiment with potatoes and margarine, controlled for a time by Prof. Abderhalden in Halle. Dr. Rose had suffered from neurasthenia and sciatica for many years. He went about with 1 gm. of morphine in his pocket to put an end to his existence if the pain should become intolerable. During the experiment he got perfectly well again. Some time later he subjected himself to a long experiment with an abundant meat diet for scientific purposes, and the old disease returned. The result of this was that he gave up his medical work, bought a cottage in the country, and now lives with his wife and children as a country gentleman, chiefly on a potato diet. I refer the reader to his book.³

We will now pass on to the *bread* experiments. Two persons lived for eight months on coarse wheat bread and vegetable margarine only. They felt in excellent condition.⁴ They also lived for a long time on our sour, coarse rye bread. They also felt well enough on this, but they were sometimes troubled a little by a marked development of flatus in the intestine when they took the large amounts of bread. The following may be given as an example :

		F M		12 days	
Diet		1,000 gm	coarse rye bread	+ 125 gm	margarine
			N	= Protein	Calories
			gm.	gm	
Diet	-	-	11·87	74 2	3,801
Excrement	-	-	4 42	27 6	480
<hr/>					
Digested	-	-	7 45	46 6	3,321
Urine	-	-	7 33	45 8	
<hr/>					
Balance	-	-	+0 12	+0 75	

Equilibrium can, therefore, be attained on 47 gm. digestible bread protein, which is contrary to Rubner's contention that bread protein is of such slight value that equilibrium is not reached until 81 gm digestible

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pure protein are taken. But are the 47 gm. a minimum? Can we not reduce the amount still more?

This question is very important. As a result of various experiments in Germany, America, and England it is regarded as settled that bread protein possesses relatively slight value, so that it must be supplemented with the dearer, but more valuable animal protein. According to our experiments this is a misconception depending on human experiments which are of much too short duration.

On a pure bread diet a minimum cannot be attained, because bread is far too rich in protein. But we made use of the method mentioned, namely, the addition of prune porridge—for example:

H.M. 12 days

Γ Diet 500 gm rye bread, 75 gm margarine, 575 gm prunes,
60 gm sugar, 60 gm starch

		N gm	= Protein gm	Calories
Diet -	-	8 41	52 6	3,785
Fæces -	-	4 86	30 4	572
Digested -	-	3 55	22 2	3,213
Urine -	-	3 37	21 1	
Balance -	-	+0 18	+1 1	

Here we have equilibrium on just as low a standard as in the case of potato protein. There are 11.5 gm. prune protein in the diet, which seems to be rather indigestible. On keeping it for twenty-four hours in the thermostat with pepsin—HCl, which is a very drastic treatment and digests more than the intestine is able to do, only 33 per cent. of the protein of the prunes was dissolved, which presumably is present largely in the skin, and this appears to pass through the intestine unchanged. The following table shows the protein balance on the bread and prunes diet:

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Period No	F M Number of days	Digested N	N in Urine	Balance	Digested N	H M. N in Urine	Balance
IV	22	4 00	4 71	-0 71	3 17	4 05	-0 88
V	12	4 70	4 81	-0 13	4 74	5 09	-0 35
VI	12	5 07	5 29	-0 22	4 99	4 66	+0 33
VII	12	4 53	5 11	-0 58	5 13	4 77	+0 36
VIII	12	3 70	4 44	-0 74	3 55	3 77	-0 22
IX	12	3 01	3 57	-0 56	5 63	4 37	+1 26
X	12	3 33	3 62	-0 29	4 84	4 53	+0 31
XI	12	3 64	3 50	+0 14	3 16	3 55	-0 39
XII	6	3 69	3 36	+0 33	4 01	2 85	+1 16
XIII	8	3 82	2 83	+0 99	3 00	3 27	-0 27

If the means are taken for some of the periods where the experimental persons showed the lowest values for digestible N—the italicized ones—we obtain :

			Digested N	N in Urine	Balance.
F.M	50 days, per day	-	3 45	3 42	+0 03
H M	38 „ „	-	3 38	3 32	+0 06

The conclusion I have drawn from this is .

3.50 gm. digestible bread N, which is equivalent to 22 gm. digestible bread protein, is sufficient to keep strong young men in protein equilibrium.

But this means that the bread protein in bread of unbolted meal has the same value as the protein in meat and milk. The opposite results, as mentioned, are due to experiments lasting much too short a time. It was thirty-four to ninety-four days before our experimental persons got into perfect equilibrium. Did this long underbalance have any injurious effect? Certainly not, for the individuals felt in excellent health, and had an unusual capacity for work and endurance.⁵

It is now thirty years since I made my first experiment on protein underfeeding, I lived one month on new potatoes, with butter and strawberries and a little milk. It was just the feeling of well-being which accompanied the diet that shook my faith in the old dogmas. Since then I have become convinced that many of the really good results obtained by apparently quite unscientific "sanatoria for natural cures" (fruit diet,

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raw food, hunger and thirst cures) are due precisely to protein underfeeding. The accumulation of old protein products is presumably a source of many chronic diseases. "The stronger lysis (through negative protein balance) is, the more rapidly does the cure progress," writes Dr. Sandoz in his book on natural cure methods.⁶

By means of experiments on rats, Osborne and Mendel have demonstrated the slight value of certain cereal proteins. Rather is it remarkable that such substances isolated by complicated chemical processes have any value at all. The two authors write⁷:

"It has been demonstrated conclusively that some of the individual proteins, like zein (maize), gliadin (wheat), and horden (barley), for example, are chemically defective and correspondingly physiologically inadequate proteins. Hence a misunderstanding of the possible value of the cereals as source of protein has developed in the minds of some persons, owing to their failure to realize that in the form in which these grains are most commonly fed the sum total of their various proteins must be taken into account."

The same authors have also shown that the protein of the wheat kernel is not of full value. Rats do not thrive well on fine bolted meal unless animal products are added. But they thrive well enough when bran is mixed with it. They write⁸:

"The crude protein of bran appears to be quite as efficient as that of the combination of wheat-flour with egg, milk or meat, under the conditions of this experiment."

This falls quite in line with our results. We were able to live in the best of health for apparently unlimited time on coarse bread and margarine, but as soon as we attempted to live on ordinary white bread, plus margarine or butter, we became so lazy in the course of two to three weeks that we could hardly

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walk. This was, of course, chiefly due to the lack of vitamin-B, but the deficient protein may have taken some share

Bran seems to be quite an excellent food material. But it is said to be indigestible by man. This, again, is an error. Our experiments showed that man, curiously enough, digests bran to much the same extent as the domestic animals. The validity of these "incredible" results has been confirmed by Prof. Wiegner in Zurich,⁹ and by Prof. Johansson in Stockholm¹⁰

We have made a number of other experiments, of which I shall only mention that two persons lived six months on barley-water porridge, sugar, and margarine. One of them, who was a patient when the experiment was begun, increased 10 kg. in weight during the experiment, and got perfectly well.¹¹ Later we tried to omit the margarine and let them live on barley-water porridge and sugar only, but this did not succeed. The men decreased in weight, and lost their appetites. Even vegetable margarine seems to contain vitamins in sufficient quantity for adult men.

What has surprised us most in all our innumerable experiments was to see how little adult men need vitamins. It shows that rat experiments may very easily be quite misleading. If one wants to discover the best food for rats, experiments with these animals are the proper ones. But if one wishes to find the best diet for man one can hardly escape using men for the experiment. Rat experiments may give some hints, but one cannot draw correct conclusions for men.

To test the importance of fats we put two persons on a fat-free diet, consisting of cabbage soup with potatoes in it and bread. The experiment lasted two years. The persons in question felt in excellent health, one even increased 9.5 kg. in weight in the first seventy days—with absolutely no fat.¹²

Fats are not a necessity. Green vegetables can replace

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fat (butter)

I reported this result in January, 1918, to Prof. Mendel, of New Haven. I proposed that he should give his rats green-stuff instead of butter. Whether it was my advice that was taken or not I do not know, but the fact is that a year later Mendel published a report which showed that spinach could take the place of butter.

THE DANISH WAR RATIONING ¹³

Denmark was spared participation in the war, but we nevertheless felt its effects acutely. We were put in a very awkward position, especially by the complete blockade from February, 1917, which will appear from the following figures. Denmark normally grows 1,100 million kg of rye, wheat and barley. She imports 1,500 million kg of rye, wheat, maize and oilcake. Consumption, 2,600 million kg.

In 1917 the importation of the 1,500 million kg was stopped, and on account of the drought we lost 300 million kg of our normal crop. We, therefore, had only 800 million kg. But 2,600 million kg ought to be consumed by the people and the domestic animals. It was quite a desperate situation, and it was not consoling that the Germans were starving although they normally raised about twice as much rye and double as many potatoes in proportion to the population as we did.

Annual harvest in millions of kg per million inhabitants.

	Germany 1912-13	Denmark. 1913-10.	Denmark 1917.
Rye - - -	175	105	76
Wheat - - -	66	68	40
Barley - - -	54	204	132
Potatoes - - -	767	347	294

The situation seemed desperate, but the solution of the problem was nevertheless extremely easy. The fact merely was that both man and pigs could not live. In Germany the pigs were allowed to live—they were not

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Copenhagen—

	1900-04	05-09.	10-14.	15-16.	1917.	1918	19-20	21-22	23-24
Men -	105	104	100	104	106	77	93	95	99
Women	96	102	100	111	110	88	98	105	105

Country—

	1901-05.	06-10	11-15	1916	1917.	1918	19-20	21-22	23-24
Men -	106	103	100	100	101	78	91	91	93
Women	102	101	100	99	103	81	97	97	95

It will be observed that on the whole there has been a tendency for the death-rate to fall from the year 1900 to 1914. In the first years of the war a distinct rise occurred in Copenhagen, which was due especially to diseases of the respiratory organs, and is naturally explained as a result of the shortage of houses and the lack of coal. Families had to huddle together in small single rooms. Although exactly the same difficulties continued in 1918, there was a fall of 20 to 30 per cent. In the country no rise of any importance occurred in 1916 and 1917, because housing difficulties were not experienced there, but in 1918 a precisely similar fall took place. This fall was so regular and constant everywhere (including the younger-age classes), that it could not be due to chance. As alcohol could not be the cause in this case—at any rate as regards the women—it must have been the alteration in the diet. But what were the active factors? This cannot be answered definitely. But it is safe to say that a diet consisting mainly of dairy produce, coarse bran bread, barley porridge and potatoes, and coffee substitute was a healthy diet for the old people, but that it was less fortunate that, when rationing was abandoned, they returned to a heavier meat diet with ordinary white bread and genuine Mocha coffee. I have worked for many years to induce my countrymen to return to the simple peasant's diet which they lived on in the country fifty years ago. I have maintained that this diet, mainly consisting of dairy produce and vegetables, was the most healthy besides being by far the cheapest.

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During the period of rationing I had the opportunity of helping to introduce the old diet of the peasants again; and the results quite came up to expectations. I do not think that there is any scientific man in Denmark now who will dispute that the ideas of Cluttenden and Hindhede were right, and that the high protein standards were a fatal mistake. If the Germans had not been hampered by these old delusions, but had rationed the nation according to the Danish method, no one in Germany need have starved.

But it is one thing to know the way and another to follow it. Ancient customs, habits, and usages are the world's greatest fetters. But how important it would be in the present critical times if the people would learn to adopt the simple peasant's diet, which would save half the money spent on food. This economical side of the question has awakened the greatest interest in my native country, but it lies outside the bounds of the present article.

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Diet and Personal Habit.

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URBANIZATION, the importation of much of our food, and other factors have made many changes in the national dietary. We consume thirty times as much sugar as we did in 1700. We use margarine and jam instead of butter, and refined cereals, tinned meat, and many foods containing preservatives. Home-grown fruits, vegetables, and dairy products are more difficult to obtain. The basis of the diet of children in the poorer districts of our large towns is frequently white bread, jam, margarine, very little milk, some meat—probably tinned, sugar, and sweets. Such a diet is very lacking in vitamins. There are indications that the results of these dietary changes are not satisfactory. Thus, there is widespread dental decay and constipation and stunted growth. The bad recruiting statistics of the war still continue. Rickets is lessening, but is still too common. Tuberculosis is still rife, and its death-rate during recent years more or less stationary. Cancer exacts an appalling toll, and about one in four or five of those who reach the age of fifty is fated to die of it. The worst food habit is constipation and the habitual use of opening medicines. Opening medicines are chiefly necessary because we eat the wrong food or too much food. Why should people accept aperients as inevitable when, by including in their diet plenty of fruit and vegetables and wholemeal bread, they can obtain the roughage necessary to stimulate the bowels, and the vitamins needed to maintain the integrity of the intestinal mucous membrane and the digestive system? As regards over-eating, it is not sufficiently

recognized that as we get older and lead more sedentary lives we need considerably less food, and that the man of, say, sixty, who needed food producing 3,000 calories when he was forty, now only requires food yielding 2,000 calories.

For the prevention of dental decay a vitamin-rich diet is needed for expectant and nursing mothers, and for the child after it is weaned. Dentists agree that the habit of giving too pappy food to the weanling has been overdone, and that the child should be given food to make it chew and exercise its jaws. Its vitamin-rich diet will provide the right kind of fat for forming good dentine and enamel. As the child grows older it can readily be taught to acquire the taste for fruit instead of the taste for sweets. There is general agreement among dentists that the habit of sweet sucking between meals is one of the most fertile causes of dental decay, and also that it is a mistake to give children soft, starchy biscuits between meals and last thing at night. In fact, three meals a day, with a tooth-cleansing food at the finish, and nothing in between is the best rule alike for the child's teeth and stomach. It is irrational to brush the teeth before breakfast so that they may be clean for ten minutes and leave them more or less "clogged-up" with fermentable sugar or starch for the rest of the twenty-four hours. Many children go short of the right kind of fat to supply them with their quantum of vitamin-A, and fall victims to rickets and tuberculosis, necessitating expensive institutional treatment. It is not realized in many families that the growing child requires more protein in proportion to its body weight than its grown-up father, who is doing hard work. The hard work of the father should be accomplished on fuel food and not on large quantities of meat. In his recent book, "Food in Health," Professor Plummer stresses the dominant position of vitamin-B in the whole question of nutri-

tion, and the danger arising from the fact that many dietaries only contain a minimal quantity, in the absence of eggs, and if white bread is used. Some have expressed the opinion that the yeast used in making white bread contains a protective quantity of vitamin-B. Professor Plimmer instances the diets containing white bread which failed to prevent beri-beri among our troops in the Dardanelles, and considers that the amount of yeast used in making white bread is too small to be of any account. In the case of our troops in the East, the shortage of vitamin-B was made good by the inclusion in the rations of yeast extract. Its household use can be thoroughly recommended for the purpose of ensuring a sufficiency of vitamin-B. This brings us to the much-discussed bread question. The first essential is for the purchaser to know, when he buys flour or bread, what he is really getting. Is he getting endosperm only, endosperm and germ, or endosperm, germ, and bran?

Brown bread may mean anything. If the purchaser knows what he is getting as flour or bread it is possible to advise him how to compensate for its deficiencies in the other articles of his diet.

Improvements in the nation's dietary can only come about by free choice after the spread of knowledge. The medical profession is the obvious agent for spreading such knowledge. When these food questions come up at medical meetings, however, so much difference of opinion is expressed on details that the public loses sight of the remarkable unanimity which exists among us as to recommendations for improvement. Thus, although some of the workers in the important research work of the last twenty-five years may lay most stress on vitamins, others on the mineral salts, others on the good quality of the protein, etc., all are agreed that the national dietary would be vastly improved by the freer use of dairy products, fresh fruit, and vegetables.

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There is also fairly general agreement that the average man should attain his calories from about $3\frac{1}{2}$ oz. of protein, $3\frac{1}{2}$ oz. of fat, and 14 oz. of carbohydrate.

To digress for a moment: some confusion must be caused to the public by the ambiguous use of the word nourishment. Thus, the frequently made statement "There is no nourishment in white bread" seems to imply that fuel foods are not to be counted as nourishment. What do we really mean by nourishment? Is it to be regarded as a synonym for all our food, or are we to reserve the term for the foods which promote growth, the repair of tissues, and the manufacture of secretions, namely, the proteins, vitamins, and mineral salts. According to this view we would only require to obtain about 400 of our daily calories from "nourishing" foods. Confusion at once arises from the fact that the fuel foods may become part of the body as fat, and that the vitamins are needed to preside over the digestion of the fuel foods. It seems better to accept the alternative, and to regard all foods which are capable of providing for our growth maintenance and energy as nourishment, and to discourage the use of such misleading statements as "There is no nourishment in this, that, or the other food."

In order to get reasonable uniformity in our advice we must have some tolerance of varying opinions. Thus, there is room for latitude in the amount of protein laid down, and the fat may be reduced somewhat, and the carbohydrate increased. Most of us prefer half the protein to be animal, but we recognize that some people make a good showing on nuts and fruit, and some on nuts, fruit, and vegetables, and we are not surprised that fruit and vegetables, with the addition of eggs and dairy products, can form a good diet. We want to avoid extremes. We all recognize the advisability of thoroughly chewing our food from infancy onwards, though we may not be Fletcherites, and

though the tradition that G.O.M. stands for grand old masticator may be exploded. We recognize the benefit of drinking some water between meal-times, even if we do not get up to as much as three quarts per day. We recognize that excessive liquid at meals retards digestion, but few of us would say that "dry" meals are necessary for healthy persons who do not know the strength of their own gastric juice. Tea is supposed to retard digestion, but that is probably chiefly when it has been stewed. Little food is consumed at afternoon tea, but those who go in for "high tea" drink considerable quantities of tea with a substantial meal. On the whole it would appear unwise for the medical profession to attempt to advise exactly how much liquid, whether water, tea, or coffee is allowable with meals, but rather it should be pointed out that from three to four pints of water should be drunk daily, and that food should be thoroughly masticated and not "washed down"

Many people do not drink enough water, and many find that it helps them to avoid constipation if they drink a tumbler of water before going to bed and on getting up. Alcohol is, of course, in no sense a necessity for a healthy person, and those who aim at being at the top of their form, bodily or mentally, are practically abstainers. Alcohol is not a food as ordinarily taken at meals, but physiologists tell us that 2 oz. may take the place of its equivalent of carbohydrate, and thus act as a food if taken in very small doses spread out through the day. Thus, we might get the food value from the alcohol in $1\frac{1}{2}$ pints of beer, or a bottle of claret, if taken in twelve two-hourly doses. In view of the experiments on the exactitude of work after alcohol, the physiologist would not permit its use at the mid-day meal during the working day. Those who take it after work, at dinner or supper, should take it because they like it, and not because it does them good, in the

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hope that the quantity taken will not be enough to retard digestion. If father's expenditure on beer or wine means that little Mary has margarine instead of butter, father's course is obvious ! Alcohol is dangerous for the child if taken by nursing or expectant mothers, and the recommendation of stout for nursing mothers has become obsolete. Another of the wrong habits is the attempt to overfeed expectant and nursing mothers. If after the child is born the mother's extra work is to manufacture a pint of milk per day to enable an 8 lb baby to double its weight in a few months her extra food requirements will not be great, and will be less still during pregnancy. During both periods a careful choice of food to provide against the drain on her calcium and vitamins is the main desideratum. Apart from the needs of the child her own food needs may be less than usual owing to a diminished output of activity.

So much for the education of the public. Some additional arrangement, however, is required to ensure that people know what they are buying when they buy bread and flour, and also food substances sold under misleading names, such as invalid wines containing no alcohol, custard powders containing no egg, lemon cheese not made of the recognized ingredients, etc. New questions are constantly cropping up under the Sale of Food and Drugs Acts, and single local authorities will not shoulder the expense of fighting a manufacturers' federation up to the House of Lords on a point affecting the population of the whole country. A central body appointed by the Ministry of Health and Medical Research Council could take up these food questions with the trading associations concerned, and make regulations as to standards, notices to the purchaser, and the use of misleading names

Bread in Relation to Diet.

By R KING BROWN, B A , M D , D P H

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THE only form of bread which is really in general use in this country is bread made from wheat, and in this article only that kind of bread will be considered. Bread can be made from some other cereals, alone or mixed with wheat, but the quantity of these used is so insignificant that it can in no way influence the national health.

Bread is the most important single article of diet that we have, and its origin, as well as that of the cultivation of wheat, from which it is obtained, belongs to the prehistoric period. Wheat was cultivated in Egypt 3,000 or 4,000 years B.C., and probably arrived in Europe about 2,000 B.C., and in Great Britain about 1,800 B.C. In the Beatus caves on Lake Thun, Switzerland, some ancient stones for grinding or crushing wheat have been preserved, which were used by the lake dwellers of the Neolithic period in that country.

The earliest Act of Parliament in England dealing with bread was in A.D 1260, and this regulated the price by public assize. It remained in force in London till 1822, and in the provinces till 1836.

Up to the year 1870 practically all of the wheat used in England was home grown, but since the introduction of roller-milling into this country from Hungary, about 1872, less and less wheat has been grown at home, and increasing quantities have been imported from abroad.

Wheat grown in different countries may vary enormously in the chief constituents, but by blending the varieties on their arrival here, millers have been

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able to maintain considerable uniformity in the composition of the flour made from it.

If a section of a wheat-grain be examined, it will be found to have a dark-coloured outer coating or skin, and a large white centre or endosperm. At one end of the grain will be found the germ, which lies superficially and is protected by the outer coat. This latter is known as the pericarp, and has three sub-divisions, known as the epi-, meso- and endo-carp, these form the bran. Just inside the epicarp is the dark-coloured testa or episperm, and under this comes a hyaline layer, perisperm or nucellus; lining this latter and situated between it and the endosperm comes a single layer of large cells rich in protein but free from starch, called the aleurone layer. The parenchymatous cells of the endosperm contain starch grains and small gluten granules. The outer layers form about 15 per cent of the grain, the endosperm 80 per cent. or more, the aleurone 3 or 4 per cent., and the germ 1.5 to 2 per cent.

Milling generally aims at the removal of the outer layers as far as possible, and utilizing the endosperm for ordinary flour. The outer layers constitute the "offal," which is composed of bran, fine bran or pollard, and "middlings." The germ is generally kept more or less separate.

There are two processes of milling, known as stone-milling and roller-milling. The former is much the older and simpler, and is performed by two large round stones suitably grooved on their inner surfaces and placed horizontally. The lower one is fixed and the upper revolves on it, and the wheat is ground between them. In "low grinding" they are almost touching, and the wheat is reduced to whole meal at one process. This is the genuine whole meal, and when this is obtained by roller-milling the offal must be put back after its removal from the wheat berry. If it is not all put back

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it is spoken of in America as "entire flour," which is used for a form of brown bread.

The whole meal obtained by stone-milling is next put through sieves of different fineness, and by this means white flour or endosperm is obtained. It is never so free from offal as that obtained from roller-milling. In "high grinding" the stones are kept farther apart, and the outer coats are removed in the first process, so that one gets white flour or endosperm, and offal known as "middlings." These latter are further treated to extract any flour that adheres to the bran, etc., and this is done in some cases by steel rollers. Only soft wheats like English are suitable for stone-milling.

The process of roller-milling is most complicated, and it has been calculated that from the time the wheat leaves the ship till it becomes flour, it travels about a couple of miles through rollers, sieves, etc.

Wheat on arriving from abroad is generally very dirty. It is mixed with all sorts of particles, such as stones, dried bits of clay, even nails, grains of sand and so on. It is first put through a series of sieves known as "scurers." It is next passed through a heavy cylinder, to separate the barley from the wheat, which is also winnowed to get rid of chaff. The wheat is then washed in water and drying. After drying it then goes to the mill proper and passes through several series of steel rollers, run in pairs. The first three or four pairs are fluted and run in opposite directions. They are concerned with the removal of the outer coats or bran, etc., from the grain, leaving the endosperm, which is broken up into small pieces, known as semolina. This is then ground in further rollers to make "break flour" or "patents." The coat-

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flakes, also fine flakes or pollard, and "middlings," a mixture of offal and flour. The middlings now pass through a series of smoother rollers of about thirteen pairs, known as reduction rollers. Between every set of rollers, from the first set of break rollers to the thirteenth pair of reduction rollers, the "offal" formed is removed by sieves, and goes to swell the final bulk of offal, which is sold for animal food. The flour obtained from the reduction rollers varies much in quality, and goes to form the ordinary or "household" flour.

The removal of the germ is a separate process, and when collected it is often put back to form some kinds of brown bread. Millers do not like it in the flour, since its fat may go rancid and spoil the flour. There are various other sieves, made of fine silk, through which the flour has to pass, so that in the end one gets a very pure white flour free from offal or germ.

The following table shows the composition of wheat, and is an average from samples examined by the United States Department of Agriculture, at the Columbia Exhibition, 1893, and cited by Hamill. This corresponds, of course, to the composition of whole-meal flour.—

Weight of 100 grains of wheat -	-	3	87	grammes
Moisture -	-	10	62	per cent
Proteins -	-	12	23	" "
Ether extractives (oil, etc) -	-	1	77	" "
Crude fibre -	-	2	36	" "
Ash -	-	1	82	" "
Carbohydrates (other than fibre) -	-	71	18	" "

The moisture may vary from 7 to 14 per cent, the protein from 8 to 17 per cent., and the carbohydrates from 65 to 76 per cent., which shows the necessity of blending if uniformity of flour is to be obtained. To sum up, then, the purest white flour consists of endosperm only, and whole meal of the total grain ground up. White flour from stone-milling is never quite freed from

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the offal or germ, since some of these are fine enough to pass the sieves with the endosperm. The same applies to the inferior flours obtained from the reduction rollers, though these may be bleached by nitrogen peroxide obtained chemically or electrically. This is a process that ought to be stopped, since the only persons who profit by it are the miller and baker, for, from a health point of view, it is very questionable.

Standard flour, which created such a stir about twelve years ago, does not possess any very constant composition, and Hamill describes it as containing "the whole of the contents of the endosperm cells (with the exception of a small amount left adhering to the coarse bran in the form of floury particles), the germ and a certain amount of finely comminuted branny particles and cell walls of the endosperm." It can be prepared by stone- or roller-milling. Whole-meal should contain all parts of the berry, more or less finely ground-up together, but many flours are prepared for brown bread by adding different portions of the offal, germ, or both, to ordinary flour, so that the bread known as "brown bread," is an article of very varied composition.

The following table gives the composition of white and whole-meal breads contrasted, and is the result of many analyses by Dr. Robert Hutchison :—

	Water	Whole-meal
Water - - - -	40 0 per cent	45 0 per cent
Protein - - - -	6 5 " "	6 3 " "
Fat - - - -	1 0 " "	1 2 " "
Starch, sugar, dextrin -	51 2 " "	44 8 " "
Cellulose - - -	0 3 " "	1 5 " "
Mineral matter - -	1 0 " "	1 2 " "

There are some forms of brown bread which undergo special processes, the principle being the addition of germ to increase the protein, vitamin content, and fat.

As an article of diet bread by itself cannot be looked upon as a complete food. It contains too little protein and fat, and too much carbohydrate. According to

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Hutchison a proper diet should have the protein and carbohydrate in the proportions of 1 to 4.2, and the fat to the carbohydrate as 1 to 6. In bread, however, the protein is 1 to 8.5 carbohydrate, and the fat negligible. Besides, we do not get full value for the protein ingested, since it is only utilized to about 50 per cent. compared with nearly 100 per cent. in beef. It is plain, therefore, that bread should only be used as part of a mixed diet.

The much debated question of brown bread *versus* white as an article of diet cannot yet be considered as finally settled. Various attempts have been made by food reformers to get people to use flours containing portions of offal, germ, etc., as in "standard flour" and the various brown breads, but the peoples of this country and America still prefer white bread, and provided the diet is sufficiently varied the question is not very important.

Brown bread has some advantages, which I may mention. Its content of fibre gives it more bulk, but less protein and carbohydrate nutriment than the same weight of white bread. The fibre is useful in combating constipation, though the effect is said to wear off in time. It contains a little more vitamin-B (anti-neuritic) than white, and more mineral matter. As, however, this last is largely excreted by the intestines, the excess may be left out of account. The protein especially, and also the carbohydrate in brown bread, are not so easily digested as those in white bread, because the fibre seems to interfere with the digestive juices. The wise course is probably to include some proportion of whole-meal bread in a general diet.

Extra fat and protein should always be eaten with bread, and in this respect the custom of drinking milk and eating butter and cheese with bread is sound.

From an economic point of view, bread must be considered one of the cheapest and best foods, for if its value be reckoned in calories it easily heads the list. A

the scheme. No explanation was put forward by him to account for the defect.

A century later Jonathan Hutchinson, another indefatigable collector and observer, in many ways resembling John Hunter, was also at work on the subject of the calcification of the teeth. In 1858 he established the fact that a crescentic or semilunar defect in the laying down of the calcium in the two upper central incisors was pathognomonic of inherited syphilis.

Besides this form of defect in the enamel Hutchinson recognized many other and much more common varieties of hypoplasia, and threw out the tentative suggestion that these defects were due to the administration of mercury in infancy. This was a suggestion, not so improbable as it may appear, for at this time mercury was still widely used, and was pushed to produce salivation. "'Tis fit," says Sir John Hill in his *Herbal* in 1771, "that the world should be reminded that half the defective teeth in young people are owing to mercurials given to children."

In the typical form of hypoplasia commonly met with the teeth affected are the central and lateral incisors, the tips of the canines, and the crowns of the first molars. The condition is symmetrical, affecting both jaws. The biting edges of the incisors are almost always affected, and the deficiency of enamel extends for some distance in the labial and buccal surfaces of the teeth towards the gum. As a rule only the very tips of the canines, and the biting surfaces, with one-quarter to one-third of the crowns of the first molars, are affected. This condition is, I believe, as pathognomonic of rickets as Hutchinson's teeth are of syphilis. While somewhat more common among the lower classes this form of hypoplasia is frequently seen among the well-to-do, and affects some 7 per cent. of the population as a whole at the present time.

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In badly nourished children of the very poor one of the chief defects in the teeth obvious to the observer is the chalky appearance of the enamel, which contrasts strongly with the clear semi-transparency of healthy enamel. The chalky appearance varies from white patches, or transverse bands on the surface of the enamel, to a general opacity affecting the whole surface. Closely associated with this, in these poorly-fed and badly-housed children, is the appearance of the brown lines of Retzius, which are due to a brown staining of the enamel running, as a rule, across the incisors, and, it may be, the canines. These lines seem to indicate a severe degree of disturbance of the nutrition in the growing child.

It is obvious that the best defence of the tooth lies in the laying down of a healthy enamel, and the use of the toothbrush and of antiseptic dentifrices can do nothing to produce healthy teeth, though they may help to preserve them when they are defective.

The calcification of the teeth begins about the fifth month of intra-uterine life, and at birth the cusps of the first molars of the permanent set are already laid down. By the end of the first year a considerable portion of the crowns of the two incisors, and of the canines, and first molars of the permanent set of teeth, is already formed. A fact not sufficiently appreciated is that by the end of the fifth year the greater part of the second dentition is already present in the child's jaw, in its permanent form which nothing can alter, long before any of these teeth are erupted, and, therefore, before they can be mechanically affected by the food taken.

What, then, is the influence of diet on dentition? Of late years the vitamin theory has been widely circulated, and has caught the public imagination leading to a multitude of eccentric dietaries and patent foods. Are we to attribute the defective teeth

of the inhabitants of Glasgow, Aberdeen, the Lancashire towns, and of our great industrial areas in general, to defective feeding and to some special lack of care or ignorance on the part of these people? Such a view will not bear examination. Coal-miners, to take a definite class, have long been accustomed to live well, and their food has been the best that money can buy, yet, as a class, their teeth are very defective. In babies fed at the breast by healthy mothers the enamel laid down during the period of suckling is frequently defective. Lack of sunshine and of fresh air and of the opportunities of exercise in the open, met with in our crowded towns and slum areas, are the essential factors interfering with the healthy distribution and utilization of calcium throughout the body, in the bones and nervous system, as well as in the teeth. Given the best feeding possible, sound teeth will not be formed where a large portion of the population is herded into crowded slums and industrial areas under present conditions.

Most of the inferences of the action of vitamins have been drawn from experiments on dogs. The results of dietetic experiments on animals are notably unreliable, and point the danger of dissociating laboratory work from clinical observation. Those experimental conditions produced on the teeth in dogs bear no relation to the hypoplasia found in the child and in the adult. These teeth are mere distended bladders of ill-formed dentine with or without a thin coating of enamel, a condition very different from the dense, hard, resistant hypoplastic tooth of the child, which frequently lasts late into adult life. There is in these animals a well-marked tendency to a peculiar over-growth of the superior maxillæ resembling very closely a condition of slower growth commonly seen in the higher apes at the Zoological Gardens even when these animals have reached adult life. The

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condition experimentally induced in these animals strongly suggests an infective process leading in the great majority of cases to the death of the animal and to the destruction of the processes of growth throughout the body. It bears no relation to rickets, and to call it experimental rickets is a misnomer. While the influence of diet on dentition is, in this country, quite a secondary one, it assumes considerable importance in so far as unwholesome foods tend to accelerate the decay of teeth already defective. Naturally, too, a supply of wholesome food is essential if such growth is to be healthily maintained. But it is a badly-balanced diet rather than the absence of any specific factor, such as fat soluble A, which is likely to lead to defects in the growth of the teeth as in that of any other organ or tissue.

The calcification of the teeth begins, as already noted, at the fifth month of intra-uterine life, and a healthy and generous dietary should be prescribed for the mother. As a rule by this time the tendency to nausea and morning sickness has passed away. I do not agree that no alteration need be made in the dietary during pregnancy. Extra milk is of great advantage to the mother and to the growing child, and fruits, especially oranges and apples, are useful additions to the dietary. If the best results are to be obtained these are necessary adjuncts to the ordinary meals of meat once a day varied by fish and egg dishes. The extra milk may, with advantage, be kept up during the period of lactation. By the end of the ninth month the permanent dentition is already far on its way to being well and efficiently laid down.

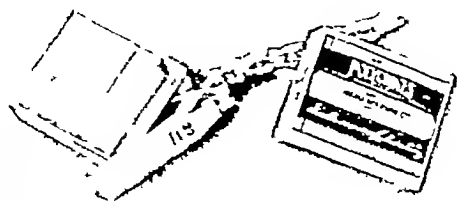
Scurvy is a condition which has for all practical purposes been abolished from this country, largely due to the universal use of the potato. Probably the majority of practitioners in this country have never seen a case of adult scurvy. There is, however, one

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small, but important, exception, and that is in the disease known as infantile scurvy, or Barlow's disease. This is a comparatively rare condition which occurs usually in infants belonging to the better class when the child is rigidly kept to one form of artificial food. It is the only example of a disease in this country definitely known to be due to the absence of a specific food factor or vitamin, and is due to the absence of the antiscorbutic vitamin. In this disease, while there is some swelling and tenderness of the gums, with small hæmorrhages, the condition does not, as a rule, proceed to the loss of teeth and alveolar necrosis, as in the old classic adult cases.

When artificial feeding is carried on the addition of fresh juice to the diet, such as orange juice or grape juice, and, later, tomato or potato, should never be omitted.

For the preservation of the primary teeth and the continued development of healthy teeth in the child beyond the period of lactation, a wholesome mixed dietary is again essential. The teeth are meant for hard wear, and it is necessary that their varied functions should be utilized. The mere mechanical act of mastication tends to promote healthy growth, and to preserve sound teeth. The food, therefore, should not be too soft. Pulpy foods, too, are apt to cling to the teeth, especially round the necks, allowing fermentation and the formation of acids which tend to attack the enamel, and to prepare the way for caries. Especially is this the case where the enamel is thin, or rough and pitted. The healthy instinct of the child to eat apples and oranges at the end of a meal should be encouraged, for not only do they constitute a wholesome food, but they cleanse the teeth most efficiently.



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- ARCHIBALD, A, M B, Ch B Edin.**, appointed Certifying Factory Surgeon for the Renfrew District, co Renfrew
- BIGLAND, A D, M D, Ch B Liverp.**, appointed Visiting Physician at the Browton Hill Infirmary, Liverpool
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- DAVIES, L Meredith, M D Oxon.**, DPH, appointed Medical Officer of Health and School Medical Officer, Northamptonshire County Council
- EDWARDS, N, F R C S**, appointed House Surgeon to St Mary's Hospitals, Manchester
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- LOGG, M H, M D**, appointed Medical Superintendent, Grove Park Hospital, Lee, S E 12 (Metropolitan Asylums Board, Tuberculosis Service)
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- MEACHIM, G L, M B, Ch B Manch.**, appointed House Surgeon to St Mary's Hospitals, Manchester
- MILNE, Y E., M B, Ch B Aberd.**, DPH, appointed Medical Officer of Health, Walsall Rural District Council
- PHILLIPS, Leonard, M S, M B, F R C S**, appointed Gynaecologist with charge of Out patients, Willesden General Hospital
- POWER, R Wood, M B, B Ch Dub.**, appointed Honorary Orthopaedic Surgeon to the Herefordshire General Hospital
- PRESTON, J A., L R C P & S Edin.**, L R F P S Glas, appointed Certifying Factory Surgeon for the Oxted District, co Surrey
- ROBERTS, T E., M B, B S Lond.**, DPH Camb, appointed School Medical Officer to the Portsmouth Education Committee
- SHERA, A Geoffrey, M A, M D, B Ch Cantab., M R C S Eng., L R C P Lond.**, appointed Pathologist (part time), to the East Sussex County Mental Hospital, Hellingly, Sussex
- STENHOUSE, G, M B, Ch B Manch.**, appointed House Surgeon to St Mary's Hospitals, Manchester
- TRUMAN, B R Beckett, M B, B Chir. Cantab.**, appointed Honorary Assistant Physician, Nottingham Children's Hospital
- TYLECOTE, Frank Edward, M D, DPH (Wilt.), F R C P Lond.**, appointed Honorary Physician to the Manchester Royal Infirmary
- WATSON, B P, M D, F R C S Edin.**, appointed Physician to Edinburgh Royal Maternity and Simpson Memorial Hospital
- WHITMAN, H D E, L R C P Lond., M R C S.**, appointed Medical Officer for the Roath medical district and the Roath and Cathays Children's Homes, S Wales.
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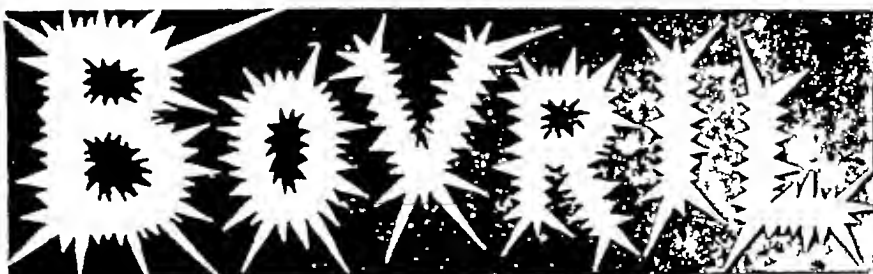


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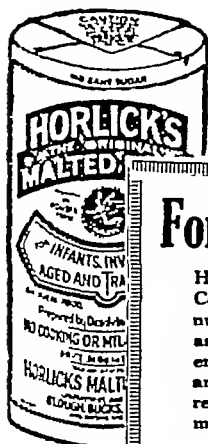
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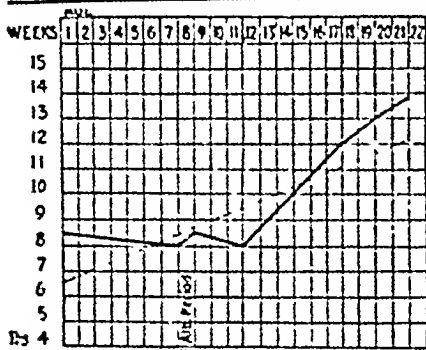
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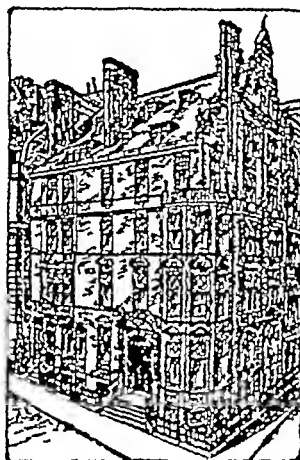
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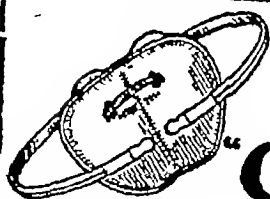
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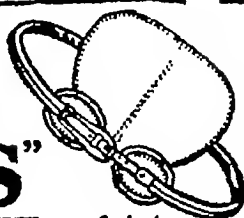
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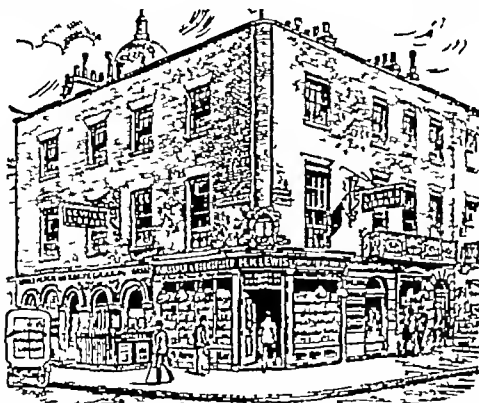
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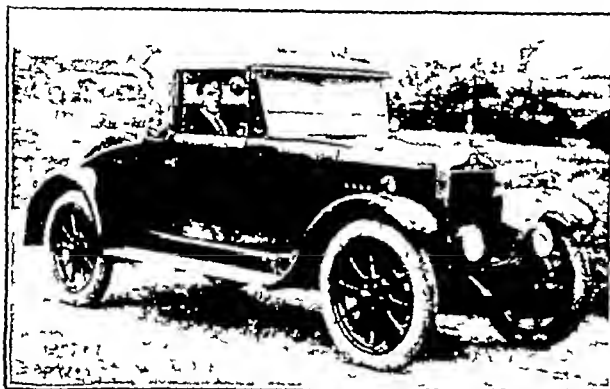
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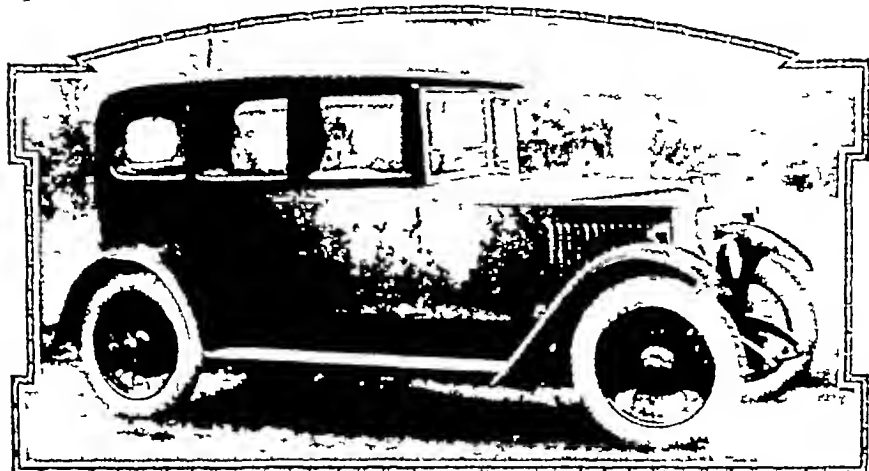
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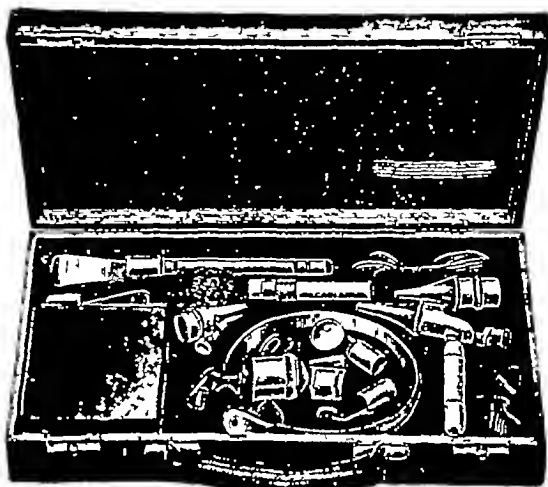
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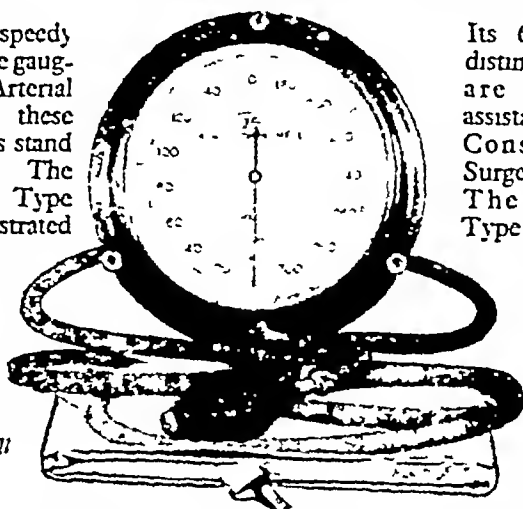
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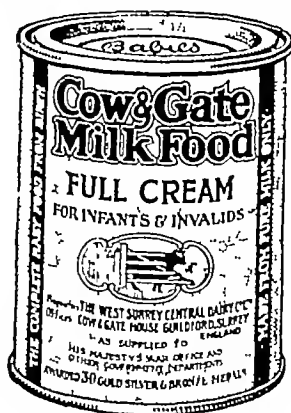
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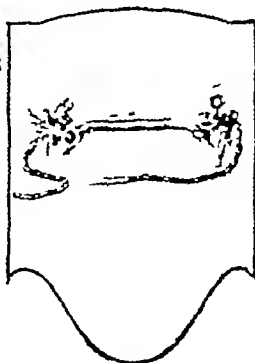
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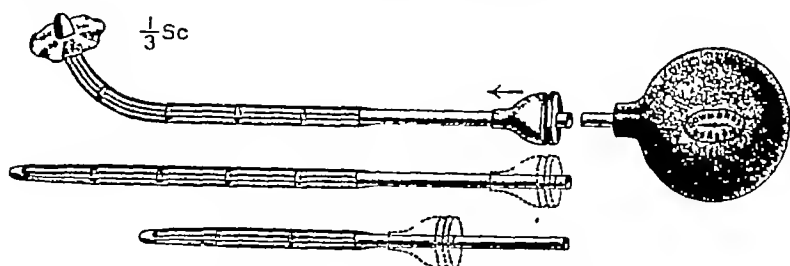
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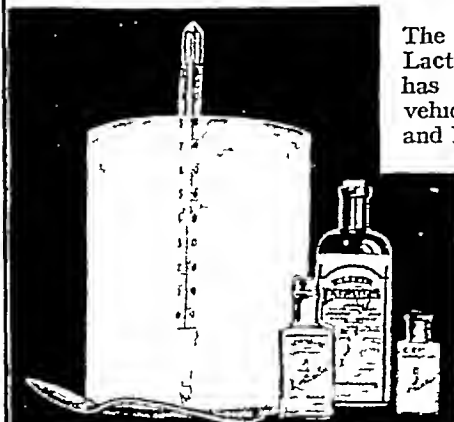
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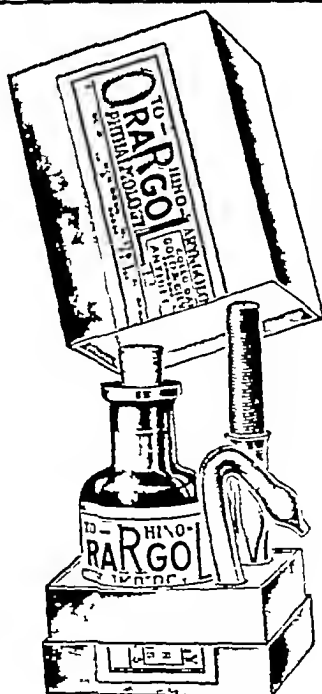
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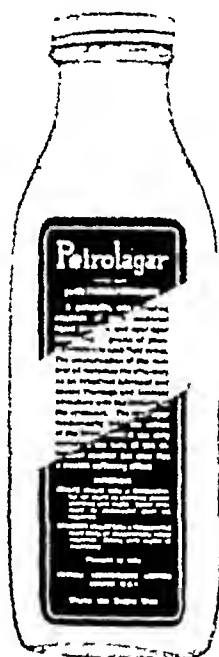
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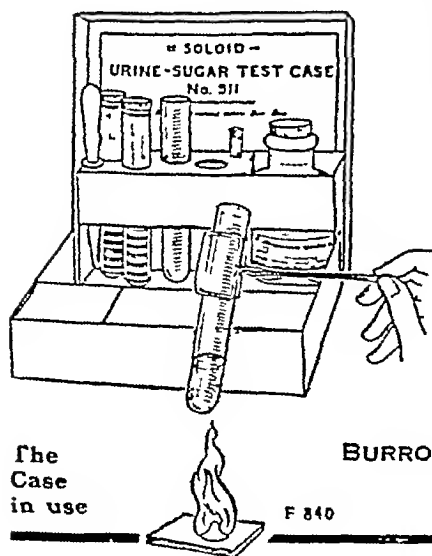
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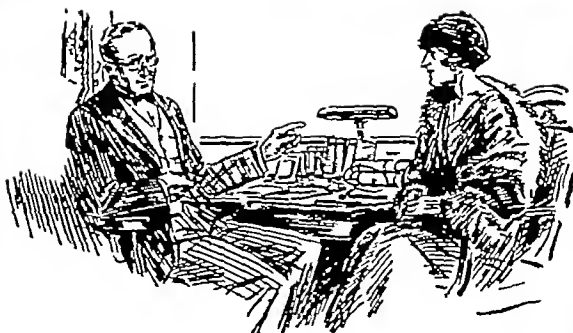


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OVARIAN OBESITY. MENOPAUSAL DISORDERS

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THE PRACTITIONER

APRIL

1926

Late and Early Carcinoma of the Breast.

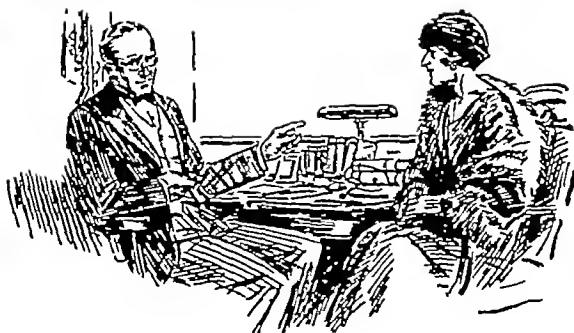
By SIR G LENTHAL CHEATLE, KCB, CVO, FRCS

*Surgeon and Lecturer on Surgery, King's College Hospital, Member
of Board, Royal Naval Medical Service, late Surgeon Rear-
Admiral, Royal Navy, etc*

Part I.

IN this article I do not propose to discuss the treatment of fibro-adenomata, sarcoma, or dermoid cysts of the breast, or what are at present usually regarded as infective processes, such as staphylococcal and other acute infections, or tuberculosis, syphilis, and other chronic infective processes. My description of treatment depends upon its relation to clinical signs exhibited by abnormal breasts. Hence a preliminary account of the essential signs and symptoms to which reference will be made is of the utmost importance.

First, the position of the patient whose breasts are under examination. A pillow should be placed behind the central part of the back, between the shoulders, so that the front of the chest is thrown forward and the breasts thoroughly exposed for examination. The head is comfortably supported, so that the neck is not curved



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72, Wigmore Street, London, W.1.

CARCINOMA OF THE BREAST

And the surgeon is to ask himself. How is he going to treat the state presented to him ?

CLINICAL STATES—THEIR SYMPTOMS, SIGNS, AND TREATMENT.

Class I —A The patient, about fifty years old, is feeble, emaciated, anæmic, and the face has an expression of suffering and anxiety; she presents all the appearances of a patient suffering from the last stages of carcinoma. On examination one of three types of tumour may be found in the breast. It may contain a large tumour, the size of a small orange, with evenly defined edges, and may slip about beneath the skin with no adherence to it. If the tumour is solid, the nipple may be drawn towards its direction, or gentle traction may drag the nipple in its direction. A history of discharge of blood from the nipple may be elicited, or blood may be apparent on the surface of the nipple. On the other hand, this large tumour may have ulcerated, the ulcer readily bleeds, the edges of the ulcer are abrupt and undermined by hard defined growth of the tumour that has not yet ulcerated at that part. This tumour is commonly adult carcinoma.

B The tumour may be a small one, so small that its presence is detectable at that point from which radiate grooves of puckered skin. At this point a small ulcer may be present, the base and edges of which are abrupt and hard. The nipple is extremely retracted, and the whole breast may be atrophied. On the other hand, the breast may be large, and the position of the tumour may be indicated by one deep groove or pucker. The nipple need not be retracted unless the tumour is near it. There is no discharge of blood. This type of tumour begins in the terminal parts of the ducts and acini, and is not a pure duct carcinoma.

C. The whole breast may be puckered and its surface wavy and irregular, and yet no definite lump

can be detected. The curious thing about this type of advanced malignant disease is that its signs are limited to what would appear to be the shape of a normal breast. The nipple is fixed and retracted, there is no ulceration, and the breast is adherent to the fascia covering the underlying pectoralis major. The state is comparatively rare, and in the four cases in which I have seen it, it has passed through the hands of others with that meaningless diagnosis, "chronic mastitis." Microscopical appearances of these breasts show one of two states.

(a) The whole normal breast structure has disappeared and its place is taken by masses of epithelial cells that are separated from each other by strands of fibrous tissue that vary in thickness.

(b) Normal areas of breast may be observed, and dispersed among its connective tissue can be seen carcinoma cells, and here and there terminal parts of ducts and acini that are more or less completely filled by epithelial cells which show nuclear hyperchromatosis, mitosis and irregularity of shape.

A, B, and C are three distinct types of carcinoma of the breast. On examining their lymphatic systems, lymphatic glands along the lower border of the pectoralis major, in the axillæ, and in the supra-clavicular regions are found to be enlarged, hard and discrete, or confluent. In the supra-clavicular regions they may be causing venous obstruction of the terminal half of the external jugular vein. They can be felt under the sterno-clavicular attachments of the sterno-mastoid muscle. Venous and lymphatic obstruction caused by their presence may induce œdema of the whole upper limb. In cases of slighter œdema it is noticeable in the skin covering the inner aspect of the arm along the triceps muscle.

Pain, which is localized and referred, is severe, extensive, and often so distressing as to become exquisite on the slightest and gentlest detachment of dressings covering an ulcer. In the chest, the pain

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may be induced by pleuritic involvement of the growth where it is more marked at the apex of the lung. X-ray pictures may show shadows beside the aorta and the roots of the lungs and even in the lungs themselves, particularly at the apex. The abdomen may be painless and yet the liver may be felt to be enlarged. On a vaginal examination enlargement of the ovaries may be detected, secondary deposits being present in these organs. There is also ascites.

Treatment:—Patients in these states are in the last phases of life, and it would seem cruel and useless to suggest any surgical interference. There are only two chances of recovery. One is that the patient may be one of those rare cases among thousands in which the disease spontaneously disappears. The other is that at any moment there may be discovered a cure for carcinoma. Even in the latter circumstance the disease may have so destroyed vital organs that its cure may no longer be able to save the patient's life. The question arises: Can a surgeon do anything to ameliorate the deplorable state of his patient? Where ulceration exists, and cutaneous nodules of the surrounding skin are manifest, it would be quite futile to suggest removing any part of the disease. Unirritating antiseptic treatment of the ulcer is the only local treatment that can improve local sepsis and hæmorrhage. Iodoform and iodoform and bismuth gauzes are of the utmost value. Where there is no ulceration and no obvious affection of the surrounding skin, removal of the tumour-containing breast may save the patient from the inevitable ulceration. The improvement in the knowledge of deep X-ray therapy and the intravenous injection of drugs or anti-bodies may some day grant hope of amelioration.

In the classes exemplified in A, B, and C, I have described three types of disease. I want here to emphasize the fact that in many instances items therein may be modified in every direction, e.g. the tumours, ulcers,

and secondary deposits may be larger or smaller in the variety of patients the surgeon must encounter.

Class II.—This type of clinical state exhibits any of the local changes I have described in subsections A, B, and C above, but the patients, in their general states, are quite different. They often look perfectly well; there is no extension of disease to the supra-clavicular glands; they do not appear to be suffering from any visceral complication, yet in this type the lymphatic glands in the axilla on the affected side are enlarged, discrete, hard, and obviously contain secondary deposits of carcinoma. These patients are, as a rule, in a hopeless state so far as cure by operative measures is concerned, and yet with due precautions, which I will mention later, their lives may be prolonged for years by operative measures. The majority of them die within the first five years after operation, but instances are known in the practices of many surgeons and physicians where life has been prolonged for varying periods, even up to thirty-one years, at the end of which latent carcinoma with some degree of suddenness renews fatal activity.

Treatment.:—The treatment of these patients is to remove as extensively as possible the breast and its lymphatic distributions. The precautions in removing these, and, indeed, all carcinoma of the breast to which I allude, are mainly directed towards preventing transplantations of carcinomatous cells. First of all, pure carbolic acid or the actual cantery should be applied to an ulcerating surface. This particular precaution possesses the additional advantage of preventing septic infection of the subsequent wound. Secondly, there should be no pressure exerted on the breasts before removal for fear of squeezing out carcinoma cells into parts that previously were free from them. Lastly, should this danger have occurred in spite of the precau-

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tion, the wound should be thoroughly soaked in a 1/500 solution of perchloride of mercury. All isolated cells will be killed by this solution. After some experience in this matter I have come to the definite conclusion that so-called recurrences in the areas of operation have become much rarer in my practice. Other surgeons employ the actual cautery in removing such breasts, with the same object in view.

Class III.—A. Patients aged from about forty onwards with a single, well-defined solid tumour in the breast over which the skin puckers, on which alone the diagnosis of carcinoma may be assumed to be correct in the vast majority of instances; yet in this class there are no lymphatic glands in the axilla to be detected either microscopically or macroscopically. There may be a discharge of serum from the nipple of these patients. Where the skin puckers early in carcinoma of the breast, the disease has begun in the terminal parts of the ducts and acini.

B There is another type of disease of carcinoma of the breast where, as a rule, the tumour is larger than the one just described, in which there is no puckering of the skin over it, and it slips about freely underneath the skin. There may be a discharge of blood or serum from the nipple. The tumour is rounded and can be, as a rule, definitely diagnosed as not being a fibro-adenoma by the fact that the latter tumour would be lobulated. This round, solid carcinoma that does not pucker the skin is one of purely duct origin.

Treatment —Some surgeons regard these clinical signs as doubtful, on the ground that lymphatic glands are not affected. Hence they remove the tumour for microscopical examination. I have no doubt that this is a dangerous proceeding, and gives rise to widespread diffusion of the disease if carcinoma is present. I

have no hesitation in performing the complete operation for the removal of the breast and all its lymphatic distributions on the clinical signs I have described in this class.

Prognosis.:—From a valuable and recent survey of this matter circulated by the Ministry of Health, the fact seems to be emerging that to this class belongs a large percentage of cures. It must be particularly borne in mind that patients suffering from carcinoma of the breast, whose axillary and lymphatic glands are apparently the only other parts implicated, are in as bad a state, so far as the hope of cure is concerned, as those patients in whom widespread secondary deposits are clinically obvious. At this point I would like to describe the microscopical discoveries that were made in six consecutive patients upon whom I operated on the following plan. I made a preliminary incision over the axillary vein and cut through the sternal attachment of the pectoralis major to reach the fat and lymphatic vessels and glands which surround that vein as it passes over the first rib. The fat, lymphatic vessels and glands were removed and microscopically examined by Dr. d'Este Emery. Having removed these structures, I proceeded to perform the complete operation. The result of microscopic examination in one of these patients was that no carcinoma could be found in any lymphatic gland in the axilla, but carcinoma was discovered in the lymphatic vessels surrounding the axillary vein as it crossed the first rib. Hence this patient was suffering from an inoperable carcinoma of the breast so far as cure was concerned. Therefore, even in patients whose axillary lymphatic glands are not macroscopically nor microscopically affected, the prognosis of a possible cure should be very guardedly given.

In the next issue of THE PRACTITIONER I propose to discuss the management and treatment of other clinical manifestations of the breast that are so commonly associated with carcinoma in its earlier stages.

The Early Treatment of Mental Disease.

By WILLIAM BROWN, M.A., M.D., D.Sc., M.R.C.P.

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IN considering the question of the early treatment of mental disease, we may start with the assertion (of the truth of which there is very little doubt) that all mental disease is also physical. In all mental disease there is physical disturbance, however slight, going on somewhere or other in the organism, and in the treatment of such disease it is obviously necessary as far as possible to deal with that physical disturbance directly. Experience shows that a great deal of mental disturbance which may become relatively permanent follows upon infections in different parts of the body, with toxic absorption and consequent deterioration of nervous activity through chemical injury. Again, disturbance of the activity of the endocrine glands, such as the thyroid, etc., has a pronounced reaction on the functions of the nervous system, and so upon the mind. Indeed, these two general physical causes of mental illness or derangement are sometimes related, in that infection and toxic absorption seem to react primarily upon the thyroid gland, and through it influence the nervous system, and so the mind. It is obvious, therefore, that in the treatment of mental disease, due care should be taken to make an adequate physical examination and to deal with the physical infection, from carious teeth, septic tonsils, chronic constipation, indigestion, subacute appendicitis, and

other forms of physical illness, to look for evidence of endocrine disturbances, and to give appropriate treatment in the form of thyroid and other gland extracts, etc. Also, still considering the purely physical side of mental disease, we have to bear in mind the possibility of fatigue and physical exhaustion being factors in the mental trouble, and we should deal with them on the physical side by prescribing physical rest. We need not emphasize these factors, because the whole force of medical tradition is likely to ensure that they will not be overlooked. Even at the present day there is little danger of the physical factor in mental disease being underestimated. The danger is on the other side—that medical men may be too ready to trust entirely to physical methods of treatment and neglect another avenue of approach, namely, the psychological.

At the beginning, one distinction is of fundamental importance, that between so-called functional and organic or structural nervous disease. Mental disturbance is a disturbance of the nervous system, and that may be due to (so-called) merely functional disturbance or to organic and structural change. When we say that a disease is functional we really mean that it shows itself only in the disturbance of function, that the correction of this disturbance of function can be brought about by psychological means, and that this will neutralize or cure the slight structural change that must be present. On the other hand, in so-called organic or structural nervous illness correction of function is inadequate to produce correction of structure.

It is usually said that mental disease often involves a *purely* functional disturbance of the nervous system, with the assumption that there is no structural change. The disease is a purely mental one, and because of that can be corrected by mental means. The difficulty of such a view is that it is impossible to conceive a dis-

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turbance of function without some disturbance or other of structure. But nevertheless there is a great difference from the practical standpoint between so-called functional and so-called organic or structural nervous diseases. One set is amenable to mental treatment, the other is not. The reason of this is that in so-called functional nervous disease the disturbance of function can be corrected by special means of a psychological nature, and thus correction of function will bring about a correction of whatever slight structural defect was present. On the other hand, in organic or structural disease, correction of structure cannot be produced, because an attempt at correcting function has no influence on the structural alteration.

I, myself, think of it in the following way. In a so-called functional disease such as hysteria, which comes especially in this category, the structural change is a kind of reversible process, whereas the structural change in organic nervous disease is an irreversible physical, chemical, and biological process. Hysterical patients have the defects of their qualities, and the qualities of their defects—they are open to good suggestion and to bad suggestion, to pathogenic and therapeutic suggestion. One means a disturbance of equilibrium in the direction of degeneration, the other a more or less adequate restoration of that equilibrium. There is then this great distinction of the functional and structural which is a helpful indication as to the kind of treatment to be used, if we can first decide whether the disease is predominantly functional. If so it is specially amenable to psychological treatment, because psychological treatment has the effect of altering function and behaviour.

The different forms of mental illness have different mental causes, and call for different mental methods of treatment. In hysteria, suggestion treatment, either with or without hypnosis, may be a quick and satis-

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factory method of improving the patient's mental condition, and enabling him to achieve greater powers of mental synthesis for himself, and a higher level of general mental energy. In such pronounced forms as spontaneous or natural somnambulism, hysterical fits, and hysterical amnesias, the patient is invariably found to be easily hypnotizable, and under the skilful use of hypnotism (which is, of course, artificial somnambulism) the natural somnambulism is destroyed, rather unexpectedly perhaps. It might be expected that the production of somnambulism artificially would only intensify the somnambulistic tendency already present, but this need not necessarily be so. The person who walks in his sleep is easily hypnotized, and under hypnosis one may put him through the experience again, and after appropriate suggestion he wakes up remembering the circumstances in which he walked in his sleep, with the result that the subsidiary tendency in his mind has become reassociated with his main consciousness, and falls under its sway once more. In such patients, after one or two treatments, the somnambulism may be completely cured. In hysterical fits the patient is readily hypnotized, and under hypnosis a fit can be artificially provoked, and the psychological concomitants of the fit can be discovered. It can be ascertained what shock in his past life, or what set of incidents, have caused the fit, and been repeated in this automatic way again and again. The emotional tendency is worked off and reassociated with the main consciousness or the main personal self, and once again falls under its sway and the patient is cured. In amnesias, or loss of memory for definite stretches of past experience, containing incidents that had been disturbing to the patient, and had been in conflict with his main personality, one may recall such memories under hypnosis, and reassociate the mind. The consequent reintegration of personality means a higher

level of mental activity, and is a protection against further lapses of this nature. This method of hypnotic suggestion may thus be used not only to clear up the symptoms but to diminish the hysterical tendency, which is at the base of the symptoms.

There are alternative methods of dealing with hysteria. One is to analyse the patient's mind in much greater detail, without the use of hypnotism or suggestion, and this is the better method. It may often be very lengthy, and in some cases it is more convenient to combine the two methods—clearing up the symptoms by hypnotic suggestion, making certain discoveries of past events through hypnotic analysis, and by further general analysis working over the mind to diminish the patient's morbid susceptibilities and to reintegrate him and produce a more normal outlook and attitude toward life

In the general case of psychasthemia hypnotizability is conspicuous by its absence. These patients are not hypnotizable, in the sense of being capable of falling into the state of artificial somnambulism. They suffer from a general feeling of incompleteness which needs help on the conscious level by encouragement, mental training, and rest, both mental and physical, to enable them to increase their general fund of mental energy, and to raise the level of psychological tension. A general re-education may be needful, whereby they are dissuaded from continually butting their heads against a blank wall of impossibility as regards their obsession or compulsion

But here again, the more thoroughgoing method is the method of analysis, to discover the past and present psychological causes of the patient's illness. This method of analysis is capable of different degrees of thoroughness. In its simplest form it is a general psychological investigation of his past life and present difficulties. The analysis is of the nature of arm-chair

conversation, in which the patient talks out his life, and one intervenes from time to time with questions and suggestions to help his own interpretation of his past, and one guides him where he seems to fail to appreciate the real significance of some incident or other in his past, or the extent to which his own reaction at the time was inadequate and unsatisfactory. One also encourages him to scrutinize closely his present mental situation, his troubles and difficulties, his ambitions, hopes and fears, and to submit them to detailed analysis, and relate them to earlier memories and mental tendencies. Furthermore, one may help him to build up a general philosophy of life, in relation to his own individual case, using the Socratic method rather than that of dogmatic instruction. This general psychological analysis, which I have called *autognosis*, may not require many hours' treatment, but the patient gains immensely therefrom. The symptoms become more intelligible to him, and it may then be found that the more automatic part of the symptoms may be diminished by formal suggestion treatment in the subwaking state. The patient is asked to lie on a couch, with voluntary muscles relaxed, and to concentrate on sleep, avoiding effort while doing so. The physician then makes suggestions in a firm tone of voice, suggestions of a general nature as regards the patient's health, and of a special nature as regards the various symptoms from which he is suffering, on the basis of what has been discovered in the preceding psychological analysis.

A more thoroughgoing form of analysis is the now well-known method of psycho-analysis, which as a method is intimately associated with the *theory* of psycho-analysis developed by Professor Freud, according to which all these nervous symptoms are to be explained in terms of disturbance in the development and manifestation of the sex instinct, taken in the widest sense of the

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term. This theory we can leave aside for the present. We may not discover sufficient evidence to constrain us to accept the theory in its entirety. Although we do find in certain cases that sex factors of a more or less general nature play a pronounced part in the causation of mental illness, we must admit that in many cases the sex instinct may seem to be little, if at all, disturbed, and the patient's difficulties may arise more directly from disturbance in other instinctive tendencies in the course of life, especially in the instinct of self-assertion, and the instinct of self-preservation and escape. These instinctive tendencies with their appropriate emotions may, in various ways, have given the patient great difficulty in the past, and the actual experience of the patient's life in relation to these instincts may involve maladaptation which the patient has subsequently attempted to correct by other reactions. So that we may find that what is apparent in the conscious mind of the patient is sometimes almost the exact opposite of what is discovered by deep analysis among the more primitive tendencies and earlier memories.

There are other general methods of treatment in the early stages of mental disease which should be mentioned. There is the method of isolation, whether partial or complete, the plan of segregation in a special hospital, or the mere separation from relatives for the purpose of diminishing the strain of social life upon the patient's mind. Social life involves its own special demand and strain upon mental activity. Adaptations to society are of great complexity, and seem to take up a great deal of mental energy, sometimes more mental energy than the patient can afford, and in this case it is important to diminish the expenditure of mental energy at once by removing him from his social *milieu* and giving him a rest. Treatment in mental hospitals has its advantages as well as its disadvantages. Its disadvantages are that it may unduly emphasize the

patient's illness and give him as companions people themselves ill, and that through imitation of these others he may find it more difficult to get better. All these objections sound more serious in theory than they are found to be in practice. Among the advantages are the well-regulated life and the greatly reduced demands on the patient, so that he is enabled to store up reserves of mental energy in an atmosphere of cure, knowing that other patients have received great benefit.

Personally, I find there is a very large number of patients who are able to continue their work while receiving treatment, who do not need to go into hospital, to whom continuation of work is really a help, not only financially but therapeutically, and under these conditions are able to afford a much more lengthy course of treatment, and benefit accordingly. The ideal method is the deep analytic method, but unfortunately it is impossible in every case. A mental home is needed when the patient is too troublesome in his own home and may be a danger to himself and others. In cases of excitability and of great depression a home is essential.

Besides these more specific mental methods of treatment there are certain physical methods, which may be classed as psychotherapeutical methods, since they are devised for their mental effect upon the patient. One such method is that of isolation already mentioned. Dejerine has applied this method to the treatment of hysterical patients. In his clinic isolation was often made as complete as possible. A curtain was drawn round the patient's bed, and he was allowed to see no one but the doctor. Another subsidiary method of treatment is, that during the first fortnight of this isolation treatment the patient is put upon a milk diet.

The rest cure has its antithesis in a work cure advocated by some doctors, but the work cure is obviously only applicable in special cases, and where the work is

congenial and does not make too large demands upon the patient's energy it should be very effective. Pottery painting, mat weaving, chair-making, carpentry, metal work, etc., have been found very helpful to certain types of patients. Simple mental exercises are also helpful.

Massage and relaxation exercises are sometimes important, and still more important are active exercises, such as riding, golf, tennis, and other games of skill, which can be a great help in getting patients back to the normal. There are some lethargic patients who will not make any effort, and suffer from not developing sufficient energy, and in these cases stimulation is needed in one form or another. Cases on the verge of severe depression, where the tendency is to sit still and do nothing, are sometimes greatly helped if they take up riding, a stimulant that can raise the psychological tension sufficiently to take them out of themselves.

It is quite obvious that these diverse methods, many of which seem to be contrary in their results, should be recommended with discretion. Different methods are applicable to different cases, and to the same case in different stages of illness. The practical thing in psychotherapy is, to a great extent, skill in the choice of means. Where skill can be specially shown is in the careful choice of means for the same patient at different times. This is not a matter of routine, it cannot be described satisfactorily in a set of written instructions, but it is gradually acquired by the physician in the course of practice.

Some Views of an Artist upon the Profession of Medicine.

By HENRY TONKS, F R C S

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I WOKE up in 1914, like Rip Van Winkle after his long sleep, to find myself back in a life I had left twenty-five years before. At first I wandered about in fear lest I should be expected to do work I had either forgotten or never known, and it was only the extreme consideration of my newly-found brethren in medicine that succeeded in giving me courage. After I had become somewhat calmer I began to look about me and to observe how the new medicine was related to the old, and the results of my observation are now noted down in *THE PRACTITIONER* for what they are worth.

There are many older men than I am in the profession, but few probably who have separated themselves from its practice for so long a time. I began my medical studies in 1879, going straight from a public school to a county hospital as a pupil, a course unknown at the present day, so that I immediately began practising medicine in some form, either by visiting the wards, helping among the patients, attending the casualties in the surgery (which was also the operating-room), or pulling out teeth—the first one, unhappily for the patient, was the wrong one. I remained as a pupil for more than eighteen months, and I am sure that that time was medically as valuable as any that came after, as I was at once brought in contact with the living human side of my work. Perhaps it was from my earliest impressions being so essentially practical

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that I felt a certain disappointment on re-entering the profession, which I did by going to a great hospital to see if I could pick up a few scraps to help me to be of some use in the war.

It seemed to me that men were relying less upon themselves and more upon information they obtained from someone else by means of machines or processes away from the patient, thereby infecting the student with the idea that disease and injury were not to be discovered by the gifts of sight, touch, and hearing, but rather by the use of elaborate machines and analyses. In fact, in medicine, as in every other walk of life, man was coming under the wheels of the machine and neglecting to cultivate his own sensibility.

As an artist this was to me a painful discovery, but of no general interest if the whole change was to the advantage of the patient. Beyond a doubt the discovery of the X-rays, the much greater use of the bacteriological and chemical laboratory and the microscope are all to the advantage of the patient, but does not the student thereby get led away from properly developing his own faculties?

Medicine never has been and never will be a pure science, it is much nearer an art than a science. The facts of science can be transmitted, whereas art can only transmit its results; its ways of producing its results are individual, often unknown to the producer, unknown in the sense that he cannot explain them, but which are the very essence of his proceedings. Artists work by using the results of long-stored-up memories, brought out as if by magic at the right moment, and this is what is known as imagination.

In my young days in medicine the machines were few, so we had to rely on our eyes, our hands, and our hearing to solve most of our problems, and by doing this day in and day out we acquired an extreme skill in diagnosis without even moving from the bedside. Now,

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the first visit of the doctor is merely preliminary to calling in specialists from every quarter before he can express any opinion, and this very wish to be thorough may lead him to miss a disease which an old physician would have seen staring him in the face.

Side by side with the study of man in disease must go the study of man in ease, and it is just here that the doctor might learn something from the practical artist. Does the medical student learn as much about man as he might? Does he really know his anatomy? What anatomist has ever known his muscles as Michelangelo knew them? We are possessed with the study of the corpse. What is less like a living being than those emaciated half-dried-up things known as subjects? We must always have them by us for reference and examination, but still more should the student have before him the living model. We learn our anatomy, or did at least, by a series of dissections, which must of necessity give an almost two-dimensional view of the body, and I remember that it was only some time after actually demonstrating anatomy that something of the real understanding of the solidity of the body came to me, when I had a better opportunity of exploring the sort of "no man's land" between the various dissections. Of course, all the facts are stated in the books, but a real grasp of things is seldom got out of books. Unquestionably without the aid of a sculptor the eminent surgeons and dentists engaged in repairing the mangled faces of the war would not have made the progress they did, they were always willing to acknowledge and to put into practice his suggestions. He, much more than a doctor, had been obliged to understand the relation of things from many different points of view, and thereby had obtained a better sense of solidity. Is the medical student made to understand the movements of the body?—perhaps the very first lesson he should have, which could be given with enough

anatomy thrown in to make any ignorant but intelligent person understand them in a general way in three-quarters of an hour.

A grasp of the movements of the human body is the gate to the study of man. By his movements in the absence of speech, or with it, he expresses his emotions. The most ordinary pose of even a professional model seems to me to be related to some mood, and unless an artist has an understanding of this relation he will never be able to depict human beings properly, or understand them. By understanding the movements of the human body a student comes to see the importance of the curves of the spine, and be brought to a sense of its beauty, and, perhaps, be made to wonder at our skill in preserving the upright position upon so small a pedestal.

I do not remember, when I began the study of anatomy, anybody speaking of the beauty of the human body. Perhaps my teachers had not noticed it. We had, when I was a student, something called surface anatomy—not a happy term, but it always seemed a kind of afterthought. I should like the living model always to be near the dissecting-room, so that everything that was discovered in the subject could be at once related to a properly-formed man and considered from different points of view, with the changes brought about by movement.

I believe, then, that anatomy might be made part of the knowledge of a doctor, not something which he can never rely upon, and which is apt to leave him in a most embarrassing manner. The visual memory is the more usual memory; indeed, it is essential for an anatomist, and the very fact of seeing something first in the dissection, and then immediately related to the model, will imprint it upon his mind in an enduring manner. Beside its value in actual anatomy the student would gain much from constantly having before him

specimens of the healthy body. It would remind him of the importance of the preservation of health, which must be the ultimate end of medicine, and which enlightened men in and out of the profession are calling for more and more. The slight changes which take place in the movements and general aspect of a man at the beginning of disease have already been made the subject of inquiry, and to discover them we must be very familiar with the perfectly sound human body.

It would be no bad thing if an artist were part of the staff of every hospital; apart from his use as a recorder of all sorts of disease, far superior to the photographer from his power of eliminating the unessential, his powers of observation and his personality might be used in other ways. Without being able or even wishing to formulate exactly how, I feel that the comments of a man whose whole life is spent in the very closest observation possible might act as a stimulus to both doctors and students, and remind them of the human side of their profession. In all kinds of plastic surgery he is undoubtedly necessary, and not without his value in the treatment of fracture. My experience of artists has taught me that the good ones are not dreamers, but essentially practical, inventive, and full of resource.

The whole trend of education at the present time is towards substituting the school for the workshop. It is the outcome of our belief in examinations and their rewards in diplomas and degrees. No examination, even in my time, was a true test of the knowledge of the man, and as a means of finding the better men it was ridiculous. Even the nurse to-day must have her college and pass examinations in anatomy, physiology, and other learning. The good nurse, like the good artist or the good doctor, is good because she has a vocation, and no diploma will add to her value. I have discovered that there is even a diploma in swimming, so that instructors of swimming can be produced

who understand the *theory* of swimming, and I feel sure that soon jockeys will be obliged to pass an examination in comparative anatomy.

We have all felt in the medical profession the weight lifted from our minds when we had done with examinations, and could seriously begin to learn our profession, whereas, with no examinations ahead, a student could be really learning it from the beginning. The good men are soon found out by the staff and their fellow students. Let doctors fight against instead of encouraging the dragooning of society by the machine, whether it takes the form of an attempt to standardize the human mind by multiplying examinations, or by encouraging the belief that any kind of instrument is going to take the place of human experience and human powers of observation. Science he must call to his aid, but it must be a tool in his hand and not a machine whirling him along faster than his judgment. Science itself is now telling us that we are naturally far more instinctive than logical; very well, let us make the best use of our qualities. We are men, not gods or machines, so that to cure the ills of man we must develop our highest man qualities, and in helping the young, who will finally take our places, we must give them no false impressions, but must make it clear to them at the start that all that they finally produce comes from their own tending of the seed which God planted in them.

Cardiospasm, or Achalasia of the Œsophagus.

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ACHALASIA is a term applied by Hurst to an interesting and puzzling condition of the œsophagus which has recently received much attention. It is characterized by an obstruction, during life, situated at the lower end of the œsophagus, with hypertrophy of the œsophageal wall above, but without any apparent cause as seen after death.

It was first described by Hannay in 1833, who regarded it as an idiopathic dilatation of the œsophagus, since no organic lesion could be found. Mikulicz, in 1882, considered that the obstruction was due to simple spasm at the cardiac orifice, and hence the name "Cardiospasm" was, and still is, applied to the affection. As, however, the condition may exist for years, and no hypertrophy of the cardiac sphincter develop, it would appear that the condition is not due to spasm. Further, since spasm of the pylorus in infants will, in a few weeks, produce marked hypertrophy of the pyloric sphincter, it is reasonable to presume that a spasm at the cardia, existing for years, should produce a similar hypertrophy.

Morell Mackenzie¹ considered that it was due to "diminished contractile power or general weakness of the œsophageal musculature," but this does not explain the consistent hypertrophy of the œsophageal wall above the obstruction. The absence of any

hypertrophy of the cardiac sphincter, together with the presence of hypertrophy of the muscular coat of the œsophagus, led Rolleston² to suggest that the dilatation of the œsophagus might be due to "a failure in the co-ordinating mechanism by which the cardiac sphincter is relaxed during swallowing," and he suggested that "paralysis or continual inhibition of the longitudinal muscular fibres of the œsophagus would allow dilatation of the tube to occur, and at the same time, by interfering with the opening of the cardiac sphincter, would induce hypertrophy of the circular muscular coat."

Later, Hurst, working independently, came to the same conclusions, and considered that the obstruction was not due to spasm, but to a "want of relaxation" of the sphincter as the normal peristaltic wave travelled down the œsophagus. The absence of any hypertrophy of the cardiac sphincter, either during life or after death, together with the fact that a mercury-filled tube often readily passes through the obstruction into the stomach, and can easily be withdrawn without any sensation of its being gripped, are the reasons upon which Hurst bases his theory. Other observers, however, are not in agreement.

Brown Kelly³ maintains that definite spasm at the lower end, with hypertrophy of the cardiac sphincter, has been seen after death, and that all the endoscopic appearances are in favour of spasm. He considers "that this spasm is predisposed to by a state of irritability of the muscle fibres, or of the nerves mechanically controlling them in the wall of the œsophagus above the hiatus." Certainly the appearance of the lower end of the œsophagus by endoscopic examination is very like that of spasm. As the end of the œsophagoscope approaches the hiatal opening (opening through the diaphragm) there is seen to be a

puckering together of the orifice, which increases as the œsophagoscope is passed onwards. When the end of the œsophagoscope comes against the hiatal orifice, quite definite resistance is frequently encountered, but usually, after pressure has been kept up for a few seconds, the tube will gradually slide into the stomach. In some cases, however, the tube will not enter the stomach. This was so in the case of a patient, aged thirty-five years, whose symptoms had existed for four years. I was unable to enter the stomach even after exerting as much pressure as I thought wise. It would seem, therefore, that there are varying degrees of this affection at the lower œsophageal opening. In the majority the obstruction, whatever it may be, is so slight as to be overcome readily by pressure, whereas in others this is impossible.

Any ulceration at the lower end of the dilated œsophagus, due to the stagnation of contents, may reflexly excite spasm of the lower sphincter, and thus considerably increase the resistance to the passage of food or the œsophagoscope. There is also one feature of pathological and clinical interest—I refer to the occasional association of achalasia (or cardiospasm) with a gastric or, perhaps more commonly, a duodenal ulcer. I have personal experience of one such case, in which symptoms of achalasia were associated with typical severe duodenal pain. Laparotomy revealed a duodenal ulcer. Unfortunately the patient could not be traced after the operation, so I was unable to ascertain whether the achalasia was improved.

Morley, at a meeting of the Manchester Pathological Society, showed a specimen of achalasia, associated with a perforated duodenal ulcer. Two points of interest were emphasized, first, that the house surgeon had mistaken foul vomitus from a dilated œsophagus for that of fæcal vomiting, and, secondly, that at the autopsy no

hypertrophy or other abnormality of the hiatal Œsophagus could be seen.

Jefferson, in a private communication, informs me that he has seen two cases of achalasia associated with symptoms of duodenal ulcer. In one the duodenal ulcer was discovered, but the other, a recent case of a young man of twenty-four years of age, was of special interest. Jefferson, believing that he was dealing with a duodenal ulceration, explored the abdomen; to his surprise no ulcer or scarring was discovered, but there was a very definite tight constriction at both the pyloric and cardiac orifices. A finger could, with difficulty, be invaginated into the abdominal Œsophagus, and the nodular firm sensation was very suggestive of malignant disease of the abdominal Œsophagus.

The X-ray appearances, after taking a bismuth meal, are characteristic: the marked dilatation of the Œsophagus above the constriction is obvious, whilst the rounded lower end of the shadow cast by the bismuth distinguishes the condition from obstruction due to malignant disease. It is further noted that the shadow ends blindly at the level of the Œsophagcal opening in the diaphragm, and not at the cardiac orifice of the stomach. This observation led Chevalier Jackson to name the condition "Phrenospasm." He considered that the symptoms and signs were due to spasm of the diaphragm.

Douglas, at the Ancoats Hospital some three years ago, in a case of achalasia, blocked the right phrenic nerve with alcohol. A complete paralysis of the right half of the diaphragm resulted, but with no amelioration of the symptoms. Recovery of the diaphragmatic movements took place six months later, and the patient remained *in statu quo*.

Woodburn Morrison informs me that two right and two left phrenic nerves have thus been separately treated without any definite improvement. I think

this goes to show that neither the diaphragm nor the crura of the diaphragm play any part in the pathology.

SYMPTOMS.

Achalasia may occur at any age, though it is more frequently seen in patients under forty years of age. There does not appear to be any predilection for either sex. The condition develops gradually without any apparent cause, though one of my cases definitely dated the onset of her symptoms to a severe attack of influenza. Rolleston records a case of achalasia developing in a boy after an attack of whooping-cough. At first the symptoms are intermittent. The patient frequently describes the obstruction as being in the upper part of the epigastrium, though occasionally the sensation may be referred to the upper border of the sternum. The onset and sequence of the symptoms can best be described in the words of an intelligent lady, twenty-four years of age, who recently consulted me:—

She dated her symptoms from an attack of influenza five years previously, and said "At first I thought that I was suffering from indigestion. I had pain at the pit of the stomach and a choking sensation after eating. Vomiting commenced three years ago. When the food reaches the lower end of the gullet I feel a choking sensation, and occasionally I vomit very forcibly. At times the vomit comes through the nose and is ejected far into the room. There is no pain at all now, but a feeling as if the stomach is full. I am breathless for about ten minutes after taking a meal. I have to drink one pint of warm tea at the close of each meal to get the food along. It has to be a full pint and must be warm. If I drink fluids before eating the food returns immediately. Occasionally the food comes back when I am asleep."

The above description of symptoms is the same as is met with in most cases. There are, however, one or two points which perhaps require special emphasis. First, the relief of symptoms with the imbibition of large quantities of water. I have frequently noted that warm water will relieve the obstruction, whilst cold water increases the symptoms and may produce

ACHALASIA OF ŒSOPHAGUS

pain. Further, it must not only be warm, but it must be copious. This fact would seem to show that the condition is not one of spasm, but a "want of relaxation," and that the added weight of a large volume of water causes the hiatal opening to dilate. The second feature of the above case is the onset with symptoms of indigestion. Is it possible that in some cases the onset of achalasia is due to the incidence of an œsophageal peptic ulceration—a rare type of ulcer occurring at the lower end of the œsophagus first described, in 1839, by Albers? Pain in the epigastrium with a choking sensation and dysphagia are typical features of such an ulceration.

Not infrequently fluids are swallowed more easily than solids, and in spite of the apparent shortage of food the patient maintains, after an initial loss, a standard weight. Often patients will relieve their discomfort by voluntarily bringing up the major portion of the meal. Occasionally the vomiting reflex has to be stimulated by tickling the fauces.

DIAGNOSIS

The history of the case and description of the symptoms are usually so characteristic that little doubt exists. The same symptoms and X-ray findings may, however, occasionally be associated with carcinoma at the cardiac orifice. The intermittent and variable nature of the dysphagia in early cases, and the long duration of symptoms in cases not previously diagnosed, are strong presumptive evidence in favour of achalasia. The age of the patient, in my experience, is not of much value, as cases of malignant disease of the cardia not uncommonly occur in young persons. An œsophagoscopic examination usually settles the diagnosis.

TREATMENT.

Various devices have been invented for dilating the

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hiatal opening. Plummer uses a water dilator. It consists of a bag, which, having been passed through the hiatal opening, is filled with water until the patient experiences pain. This dilatation has to be frequently repeated, and is, I think, a method little adopted in this country. The mercury-filled œsophageal bougie of Hurst is frequently employed, and is a useful instrument. This bougie, by virtue of its own weight, readily slips down the œsophagus, and usually passes into the stomach. The patient at first swallows it just before each meal, but in time the tube may only be required once a day, or even once a week. The tube is kept in position for a few minutes and then withdrawn, and should not project more than an inch into the stomach, for fear of setting up gastritis. To prevent this, the bougie is marked at levels of 16 inches and 17 inches from its lower end. As, however, occasionally the end of the bougie will not engage in the hiatal opening, but curl up in a dilated œsophagus, it is important to verify its position by X-ray examination before adopting treatment by this method. The ordinary gum-elastic bougie rarely engages in the lower end of the œsophagus, and is usually only of service in dilating, under vision, a resistant sphincter prior to using the mercury tube. The patient should at all times eat slowly, with thorough mastication, and the value of a copious draught of warm water has already been stated.

References.

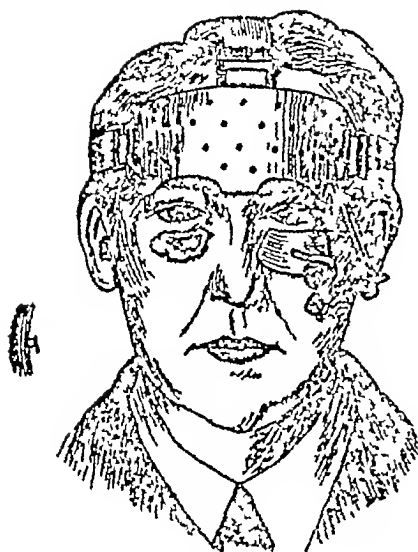
- ¹ Morell Mackenzie "Diseases of the Throat and Nose," 1884
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The Extended Use of the Whole Thickness Skin Graft.

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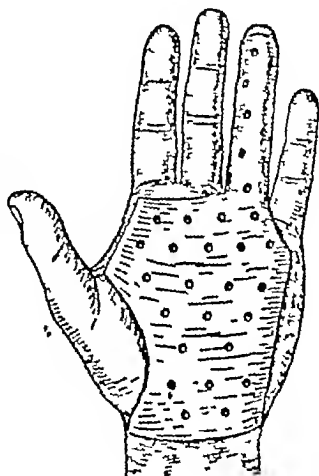
EXPERIENCE has shown that the Wolfe graft is capable of steadily increasing application. Its superiority to the Thiersch in plastic surgery, particularly in exposed parts of the body, is so defined as to justify the expenditure of considerable trouble and the exercise of persevering ingenuity in endeavours to extend its scope. In situations such as the forehead presenting firm resistant surfaces that make easy the maintenance of firm steady pressure, the Wolfe graft has given consistently good results. In other parts of the face raw areas in soft parts constantly subjected to slight movement are not so easily dealt with. Particularly is this the case in the loose yielding tissue in and around the neighbourhood of the lower lids, an area prone to be affected by rodent ulcer. Many methods have been tried, but they are defective in one way or another, either on the score of discomfort, lack of elasticity, or difficult access to the area concerned. To meet the difficulties encountered in the excision of rodent ulcer from this part of the face, the apparatus figured has been evolved. The broad metal forehead piece is lined with Stent's modelling compound, and ensures a large, firm, accurately fitting bearing surface. A small piece of soft metal is cut to the shape and size of the incised area and bent to the contour of



the part. On its upper surface a circular depression is made with a punch designed for the purpose. When the graft has been sewn into place, the under surface is covered with a small quantity of hot soft Stent and gently pressed home over the area involved. The arms of the apparatus are then so arranged that the little

knob on the terminal spring arm fits snugly into the depression on the upper surface of the little piece of metal. In this way light constant pressure is maintained with the least discomfort to the patient, and the maximum of accessibility. The results obtained by excising rodent ulcers, and covering immediately the raw area with a Wolfe graft, have shown that the method is practically and cosmetically reliable, and that recurrence need not be feared in early cases if a sufficiently wide margin of apparently healthy tissue be included in the excised area.

A further use to which I have successfully put the whole thickness skin graft is in the case of cicatricial contractions producing flexion deformities of the fingers. In this type of case a good result may confidently be expected provided one or both long flexors are intact. When the scar tissue has been excised and the fingers straightened, a raw surface of



SKIN GRAFT

roughly diamond shape will be left. A graft of the required shape and size is cut and sewn accurately in the defect. A perforated zinc splint (see figure), shaped for the particular case, is filled with soft Stent, gently pressed home, trimmed as may be required, and bandaged in position. The results obtained have exceeded all anticipations, and have resulted, in many cases of machinery accident, in the restoration to good use of fingers recommended for amputation. The method is applicable to congenital conditions, such as webbed fingers, acquired deformities such as Dupuytren's contracture, and traumatic and septic conditions such as may follow accidents, septic infection, and burns.

A brief account of a recent case will demonstrate the utility of the method:

Nurse D, referred to me in July, 1925. As the result of severe septic infection her right thumb was bound down by scar tissue, and occupied a flexed and adducted position with the atrophied terminal phalange flexed at a right angle. She was just at the beginning of her training, and the disability occasioned was so marked as to threaten her career. An X-Ray photograph showed the joints to be practically normal. At operation the scar tissue was removed and the thumb was eventually reduced to occupy the position of extreme abduction and extension. When this was done there existed a large, raw, roughly quadrilateral area extending to the interphalangeal joint and straddling the interosseous space, which had been obliterated by scar tissue. A Wolfe graft of the size and shape of this raw area was cut from the thigh and sewed accurately to the margins of the denuded area, covering in the long flexor tendon of the thumb. The hand and thumb were bandaged to a splint specially adapted and of the nature figured. Progress was more or less uneventful, except that a small area of the graft on the palmar surface sloughed, and healing was somewhat delayed. The movements of thumb are now good, the interosseous interval has been reconstituted, she can wield a tennis-racket, has good apposition, but is hampered in finer movements by loss of sensation which was present before operation. She will certainly be able to continue her training.

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salvation and gradual closing of the throat, but he never again suffered actual pain—any sign of a return of this being at once checked by further X-ray treatment

This case was treated by high voltage X-rays, because cancer in the region of the jaw and throat seems to respond best to a hard radiation. The capacity to relieve pain is not, however, peculiar to X-rays of the type produced by modern apparatus, such as has come into prominence within the past few years.

Case 2—In the year 1912 I was asked to see a patient, a Quaker lady, who was dying from a painful form of peritoneal cancer. She refused, on religious grounds, to be kept under the influence of morphia, yet her sufferings were so great that she could not control the expression of them, and greatly distressed all those about her. She was much too ill to be brought to my rooms for treatment, and a portable plant was set up in her bedroom. The quantity of X-rays available was very small, but daily doses of about half an hour's duration were given, at first, a three-millimetre aluminum filter being interposed. By the end of a week the pain was nearly gone, and from that time until her death, a month later, the patient remained comfortable.

The presence of extensive swelling of the arm and shoulder is not necessarily any bar to the success of X-rays as analgesics. The following case illustrates this fact.

Case 3—Miss M., a woman about forty years of age, was sent to me in July, 1923. She had extensive cancer of both breasts—the right much retracted and firmly fixed to the ribs. She had been in great pain for some weeks, and only when this became unbearable did she consult a doctor. As a result of X-ray treatment the growth on both sides shrank considerably, and pain ceased. She received another course of treatment three months later, and there was a further shrinkage. Things went well till February, 1924, when, quite suddenly, the right breast, right arm, and right side of the face swelled in an alarming manner, and this was accompanied by great distress. She came to see me again, and although I saw it was impossible to save her life I gave her a heavy X-ray dosage. She returned home, and a month later was sinking fast, but *had had no return of pain*.

No hard-and-fast rules can be laid down for the administration of X-rays for analgesic purposes. The small dose two or three times a week usually does well, and has the advantage that it cannot, even tem-

porarily, lower the patient's vitality. But concentration may succeed where fractional dosage fails; and, apart from this, the administration of a course within a few days has advantages where patients come from a long distance, or are immersed in affairs, as the good effects last for two or three months.

Apart from their effect on pain, X-rays may relieve various minor discomforts associated with malignant disease. Although the word "minor" is legitimately used in medical descriptions, the complaints so designated are often regarded seriously enough by patients—who, it should be remembered, frequently do not know the real nature of the malady from which they are suffering, and, therefore, lack our standards of comparison.

That X-rays are often effective as deodorants I have previously mentioned (see Case 1). They may also cause the drying up of troublesome discharges, which can render miserable the life of a patient, even if he has no pain.

Case 4—Mr G P had a colostomy done in 1923 for cancer of the rectum. He was kept in ignorance of the nature of his disease. The operation freed him from pain, and, by means of a daily enema, he was enabled to determine the time of evacuation of the bowels. He could fish and play golf. The surgical intervention may, therefore, be said to have been very successful—but the patient was unhappy. He complained of a blood-stained slimy discharge, which persistently oozed both from the lower opening of the colostomy wound and from the anus. He consulted a local surgeon, who advised him to try X-rays. Unconvinced, he wrote to the surgeon in London who had operated on him, and asked his opinion. In reply he received a letter urging him not to submit to radiation treatment, "which could do him no good, and quite possibly might make him worse." The patient, therefore, gave up the idea for some weeks, but increasing discomfort finally led him to disregard the great man's advice, and he came up to see me. He was given a semi-intensive course lasting a week, at the end of which time the discharge was rather less. He then returned to the country. After four weeks he wrote to say he was much better. I heard no more about him till, six months later, his wife called to see me. Her husband, she told me, had recently died, but whether from malignant metastases or from heart failure is not certain. She informed me, however, that during the last months of his life he had been comfort-

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able in body and contented in mind, the discharge having practically disappeared.

In considering the use of physical remedies for the relief of pain in cancer, one must not lose sight of the value of diathermy and synthetic sunlight. Where pain following operation for breast cancer—with or without swollen arm—is not relieved by X-rays, diathermy should be given a trial. Where there is general physical and mental depression, treatment of the whole body by a combination of lamps, so arranged that the longer rays of the spectrum are present as well as the ultra-violet, is often of great value. The patient improves in health and spirits, and *pari passu* with this improvement the pain usually lessens. Even if the lessening of pain is not directly accomplished, the patient is brought into such a condition that he responds to further X-ray treatment, although it may previously have been ineffective.

Just as the use of the above means ought not to be forgotten when dealing with painful cancer, so the value of X-rays as analgesics should be borne in mind in the case of certain afflictions where electricity is generally the first resort. In obstinate sciatica, in neuralgia following herpes, in the girdle pains of tabes, in fact, wherever there is persistent pain not dependent upon shut-in sepsis, X-rays—though not, of course, always successful—are worthy of a trial.

Case 5—A M, a man of 55, suffered from a severe attack of shingles affecting half the face and scalp. After the subsidence of the attack, pain of a severe neuralgic type remained, and was unrelieved two years later. A doctor, whom he met casually, suggested X-rays, but his family physician would not hear of this, and for some months succeeded in dissuading him. Finally he sought other advice, and was sent to me. X-ray treatment banished the pain in six weeks, and it had not returned a year later. (It should be mentioned that "ionization" and high frequency had previously been applied without success.) The patient meanwhile had resumed the outdoor life which appealed to him, and from which he had been barred for nearly three years.

The reluctance of some practitioners to permit their

X-RAYS IN CANCER

patients to undergo X-ray treatment is, I think, due to a fear, conscious or sub-conscious, that injury may result. The massive doses of the Erlangen school—which never found general acceptance among the radiologists of this country—may, indeed, be harmful, both locally and constitutionally. X-rays applied solely for the relief of pain or discomfort need never even approach a dosage which is dangerous. The remarkable effect of very small doses—an effect which is in essence neither depressing nor stimulating, but *regulating*—is well seen in ductless gland disorders, notably in exophthalmic goitre; and it is often possible with amounts equally small to control the pain of cancer. Such treatment may be continued for months with the production of nothing worse than slight temporary browning of the skin. It is, however, usually preferable to employ somewhat larger doses for a few weeks at a time. Doubtless there is still some element of danger even in a modified form of intensive therapy, but, if small doses have failed, it is justifiable to use it when a palliative effect alone is aimed at. It may relieve the pain, despite the failure of minor measures, and, in some cases, apparently hopeless, may even cause general improvement for a time.

In concluding this brief account of the pain-relieving properties of X-rays, I should like to point out that they share these properties with other forms of radiation. Radiant heat and ultra-violet light are both powerful analgesics. The relief of pain by heat is so well known a phenomenon that it is accepted as a matter of course, and excites neither incredulity nor wonder. It is generally “explained” by stating that the benefit is due to dilatation of surface capillaries. X-rays also produce capillary dilatation, though not of an obvious type. In neither instance is the explanation adequate, nor is the clinical result either more or less mysterious in the one case than in the other.

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The reluctance of some practitioners to permit their

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Condition on admission—Her general condition is poor, and she has evidently lost weight. There is marked pallor. There are no subcutaneous hæmorrhages, and there is no enlargement of the superficial lymphatic glands. She is edentulous. The mucous membrane and tongue show marked pallor. The tonsils are not enlarged. The abdomen is protuberant, and on palpation a large, hard, smooth, and definitely notched mass is felt occupying the whole of the left side of the abdomen from the left costal margin to the pelvis, and extending to $1\frac{1}{2}$ in. to the right of the middle line. The liver is not palpable. The pulse rate is 88 per minute. It is regular in force and rhythm and of low tension. The area of cardiac dullness is slightly enlarged. The heart sounds are pure, but of poor quality. There is no abnormality in the respiratory, nervous, or genito-urinary systems.

Blood Examination

Red cells	-	-	3,600,000	Leucocytes	-	60,000 per cm
Hæmoglobin	-		48 per cent	Colour index	-	- - - .6

Differential Count

	Per cent		Per cent
Eosinophils	- - - 6	Hyaline	- - - 7
Neutrophils	- - - 55	Nucleated reds (megalo-	
Basophils	- - - 0.5	cytes)	- - - 1
Large lymphocytes	- 12	Transitional cells	- 5
Small „	- 12	Mast cells	- 2

On July 17 she had one 100 per cent dose of deep X-ray treatment (Erlangen method) over the spleen, area 15 by 10 cm. Distance, 35 cm, filter, 5 mm zinc. There was no rise of temperature after the treatment, and she felt no immediate after-effects. The improvement which followed was very marked. The sense of exhaustion soon disappeared, and from being lethargic she became alert and active, even when the leucocyte count fell to 2,000 she felt quite well. The spleen began to diminish in size almost immediately, and when she was discharged from hospital on October 3, 1922, it was not palpable below the costal margin.

Blood Count

Date	R B C	Leucocytes	H B Per cent	C I
20 7 22	3,700,000	37,000	40	5
24 7.22	3,100,000	29,000	38	6
30 7 22	3,790,000	27,000	34	4
9. 8 22	4,125,000	10,400	36	4
16 8 22	5,056,000	8,400	42	4
23 8.22	3,488,000	6,200	48	7
30 8.22	3,500,000	2,300	44	6
6 9 22	3,710,000	4,200	56	7
13 9 22	4,900,000	3,400	62	6
4.10 22	4,820,000	4,400	64	6

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Date	R B C	Leucocytes	H B Per cent	C I
11 10 22	5,120,000	6,560	65	·6
18 10 22	6,000,000	6,400	70	·5
10 3 23	5,780,000	25,000	91	·8
13 4 23	3,410,000	25,000	30	4

She remained well until January, 1924, when she noticed that she had difficulty in undertaking her household duties. She became progressively weaker, and she suffered from breathlessness and loss of appetite. In February she had an attack of hæmatemesis, and she noticed that her stools were dark in colour. She had severe epistaxis four times during the month. She also suffered from vomiting, and she noticed that her spleen had become enlarged. When readmitted to hospital on March 19, 1924, the lower border of the spleen was 1½ in above Poupart's ligament.

Blood Count and Treatment			H B	C I
Date	R B C	Leucocytes	Per cent	C I
19 3 24	4,310,000	198,000	64	7
26 3 24	One 75 per cent dose over spleen area 15 × 10 cm Distance, 35 cm			
31 3 24	3,400,000	110,000	58	8
3 4 24	3,510,000	96,000	65	9
14 4 24	4,700,000	42,000	65	·6
5 5 24	4,500,000	24,600	68	7
12 5 24	One 80 per cent dose over spleen (front) area 15 × 10 cm One 80 " " " (back) " 15 × 10 cm			
13 5 24	4,258,000	19,200	70	8
19 5 24	4,200,000	9,000	73	8
3 6 24	5,360,000	11,400	72	7
12 6 24	4,230,000	14,500	75	8
23 6 24	One 50 per cent dose over spleen (back) area 15 × 10 cm			
27.6.24	5,660,000	35,000	80	7
30 6 24	5,500,000	25,500	78	7

The improvement in general health was again very marked during her stay in hospital, and she gained 7 lb in weight. When discharged on June 30, 1924, the spleen was palpable below the costal margin. After her discharge from hospital she remained well until the middle of August when she began to feel weak. She had a slight epistaxis, and, later, diarrhoea with blood in her stools. She noticed that her spleen had become enlarged.

She was again admitted to hospital on September 4, 1924. Pallor was not a marked feature on this occasion. She suffered from diarrhoea, which continued for four days after admission, but no mælena. The lower border of the spleen was 2 in above Poupart's ligament.

Blood Examination

Red cells	-	5,200,000	Leucocytes	-	156,000
Hæmoglobin	-	62 per cent	Colour index	-	6

Films show numerous whites, myelocytes, neutrophil, basophil and eosinophil leucocytes, and some megaloblasts.

SPLENOMEDULLARY LEUKÆMIA

		<i>Blood Count.</i>		H B	
Date.		R B C	Leucocytes	Per cent.	C I.
15 9 24		4,280,000	113,850	75	·8
26 9 24		4,700,000	83,700	80	·8
6.10 24	One 70 per cent dose over spleen (front) area 15×10 cm Distance, 35 cm				
	One 70 per cent dose over spleen (back) area 15×10 cm Distance, 35 cm				
9 10 24		2,980,000	37,600	65	1·0
28 10 24	Discharged, much improved Patient able to go about without undue fatigue Leucocytes number 11,800				
<i>Deep X-ray Therapy (Out-patient)</i>					
17.11.24	One 50 per cent dose over right thigh area			15×10 cm	
	" 50 "	" " left	" "	15×10 cm	
	Leucocyte count, 12,800				
1 12 24	One 60 per cent dose over right shin area			15×10 cm	
	" 60 "	" " left	" "	15×10 cm	
	One 30 percent dose over right shoulder area			15×10 cm	
	" 30 "	" " left	" "	15×10 cm	
	Leucocyte count, 13,500				
13 3 25	Leucocyte count, 30,000 Spleen just palpable under costal margin Patient feels very well.				

A few cases of splenomedullary leukaemia are stated to recover, but the large majority of cases run a chronic and progressive course, terminating fatally in two to three years. The foregoing case is of interest in that it is now over three years since she first received treatment, and with the exception of two relapses she has continued in good health and been able to carry on her household duties. It is interesting to note that the most marked improvement resulted from one 100 per cent dose, and that the first relapse in her condition did not occur until two years later. The subsequent dosage was decided on as a result of the severe drop in the number of leucocytes, which occurred after her first treatment. The response to further treatment by smaller doses was neither so rapid nor so pronounced, while the subsequent increase in the leucocyte count took place earlier.

The result of treatment as observed in this case has been much more satisfactory than that obtained by ordinary X-ray methods, and a single maximum dose is, in my opinion, more satisfactory than repeated smaller doses.

Local Anæsthesia in General Practice.

By W QUARRY WOOD, M D, CH M, F R C S
Assistant Surgeon, Edinburgh Royal Infirmary

THE question of anæsthesia is one which affects every medical man. It is now fully recognized that the efficient administration of a general anæsthetic is an art, and requires for its performance one who has served a faithful and prolonged apprenticeship. In general practice, especially in the more remote parts of the country, it is not always easy to find one who is so qualified. Apart from the risk to life of unskilled administration, general anæsthesia is apt to be followed by considerable discomfort from sickness, and exposes the patient to the dangers of bronchitis and other pulmonary complications, and of delayed poisoning. There are two classes of case commonly met with in ordinary practice where a general anæsthetic must be regarded as unjustifiable, the first consists of most minor surgical affections, the second of certain abdominal emergencies, which, under special conditions, the practitioner may be compelled to deal with himself. With regard to minor surgical operations, there are few of these that cannot be performed painlessly and efficiently under local anæsthesia, and it becomes the duty of the practitioner at least to allow the patient to make his own choice after the circumstances have been fully explained to him. It is impossible to say that any general anæsthetic is safe; indeed, the tragedies of general anæsthesia appear to occur not infrequently where it has been given for comparatively trivial conditions. On the other hand, it is possible to say that local anæsthesia,

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administered with reasonable care, is entirely free from danger.

The second group of cases, namely, certain urgent abdominal conditions, are usually handed over to the surgeon, but in distant parts of the country the practitioner may be compelled to operate on these himself. In patients who are dangerously ill—exhausted by prolonged vomiting in intestinal obstruction or enfeebled as a result of cardiac, pulmonary, or renal disease—the administration of a general anæsthetic will often in itself be fatal. These cases can be dealt with in an extremely satisfactory way under local anæsthesia: an enterostomy can be performed to relieve an obstruction, strangulation of a hernia can be relieved, and many other life-saving measures can be readily carried out without distress to the patient, and without adding to the heavy handicap under which he already labours.

Why is local anæsthesia not more frequently employed in general practice? One reason is probably the belief that a highly-specialized armamentarium is required. Another explanation in some cases is a failure to obtain satisfactory anæsthesia, either owing to some mistake in the method of administration or from attempting to use the method in unsuitable cases. If the limitations of the method are recognized, it can be employed in general practice for a considerable variety of conditions, and with great satisfaction to both doctor and patient—provided that certain rules are carefully observed. The apparatus required is of the simplest character, and involves a very small outlay.

It is well, perhaps, to consider the limitations first. The method requires the co-operation of the patient, and unless this can be secured, it is a mistake to proceed. The patient will feel the initial prick with a fine needle and, although this, in reality, produces little or no pain, in certain subjects the apprehension which

already exists—causes a reaction out of all proportion to the injury inflicted. If there should be any further pain produced due to some slight failure in technique, the result will be most unsatisfactory. If, on the other hand, the co-operation of the patient can be obtained, the needle-prick is ignored, and the operation proceeds smoothly and comfortably. The temperament of the surgeon plays an important part in attaining a successful result, equal, perhaps, to that dependent on the psychological condition of the patient.

Local anæsthesia fails entirely in an inflamed area. An attempt to infiltrate such a hyperæmic and cedematous region will increase the tension in the part, and will cause intense pain, with the risk of sloughing of the tissues injected. The method should never be used in acute sepsis.

Speaking generally, it may be said that the method is unsuitable for intra-abdominal operations. The abdominal wall can be anæsthetized perfectly, but manipulation of the viscera is liable to cause pain. The pain is due, not to the presence of sensory nerves in the viscera themselves, but to traction on the highly-sensitized parietal peritoneum, through the mesenteric or other visceral attachments. If the intra-abdominal manipulations can be reduced to a minimum, as in gastrostomy or cæcostomy, the method can be used with success.

We may consider next the conditions in which local anæsthesia is especially indicated, and in which it may be easily carried out. Of minor surgical affections in which the method is particularly suitable, mention may be made of small tumours and cysts, amputations of fingers and toes, hæmorrhoids, circumcision in the adult, hammer-toe, hallux valgus, and skin-grafting, though a great many other conditions might be added to the list. In the second group of cases mentioned above—patients dangerously ill, and in whom a general

LOCAL ANÆSTHESIA

anæsthetic is contra-indicated—the value of local anæsthesia cannot be over-estimated. Intestinal obstruction is one of the most dangerous of emergency conditions, and is associated with a very high mortality; if the patient is in a critical state it is much wiser to limit the operative procedure to a simple enterostomy under local anæsthesia than to attempt any extensive exploration. In strangulated hernia the strangulation can be relieved, if need be, under local anæsthesia, and the radical cure performed painlessly; resection of the bowel can be carried out without great discomfort, if care is taken to avoid unnecessary traction on the mesentery. The writer has resected over seven feet of small intestine under local anæsthesia in a case of strangulated umbilical hernia. Of other operations in which the method is satisfactory, one would refer especially to acute empyema—in which condition the lungs are often recovering from a pneumonia, and not in a state to withstand the irritation of a general anæsthetic—tracheotomy, cerebral decompression, and suprapubic cystotomy.

The technique of local anæsthesia is simple, the necessary outfit is limited in quantity, easily prepared, and very cheap, so that the method is admirably suited for use in general practice. The apparatus required consists of a syringe, two sizes of needle, novocaine tablets, adrenalin solution, a spirit lamp and stand, and a four-ounce measuring glass. An ordinary record syringe of 10 c.c. capacity serves admirably. One needle should be 1 in. in length and fine, the other should be 3 in. If the larger needle is of stainless steel it can be used repeatedly, and does not become clogged. The fine needle should only be used once, as it is essential that it should be perfectly sharp. Syringe and needles can be sterilized by immersion for ten minutes in a solution of 1 in 20 carbolic acid. Novocaine is decomposed by contact with an alkali, so that it is

absolutely essential that no alkaline substance, such as lysol, should come into contact with syringe, needles, or novocaine solution. Novocaine tabloids, to make a .5 per cent. solution when dissolved in distilled water, can be readily obtained. The solution must be boiled before use, and for this purpose a suitable glass vessel, a small stand, and a spirit lamp are required. Novocaine is not harmed by boiling, and the solution should be boiled for at least five minutes. The adrenalin chloride solution (1 : 1,000) should then be added in the proportion of three or four drops to the ounce of novocaine solution, and the solution again brought to the boiling-point. Adrenalin is decomposed by boiling for any length of time, and it is quite sufficient to treat it in this way. Adrenalin forms a valuable addition to the anæsthetic solution, since by its vaso-constrictor action it delays the absorption of the novocaine and prolongs the anæsthesia.

The injection is nearly always made by the *infiltration* method. In this method the tissues to be operated upon are flooded with the anæsthetic solution. The secret of success consists in using plenty of the solution and infiltrating the field of operation thoroughly. In making the first injection the skin should be pinched up between the finger and thumb, and the fine needle inserted with a quick thrust. If the needle is sharp this prick is almost painless. A wheal is produced by injection of the skin, and the needle then pushed on to its full length, the fluid being injected as the needle advances. From this starting point the long needle can be introduced into the deeper tissues without pain. As wide an area as possible is infiltrated from the one puncture. The needle can then be withdrawn and introduced at a fresh point, which has already been rendered analgesic. Very often the procedure can be planned so that the patient feels only the initial prick. It is usually advisable to anæsthetize the skin at the

LOCAL ANÆSTHESIA

site of each successive puncture by causing the needle to enter it from its deep surface in making the preceding injection. The periosteum and the parietal peritoneum are highly sensitized, and must be infiltrated with special care. In the case of the latter structure, if the operator is not certain that he has reached it from the surface, he should make a fresh injection when the extra-peritoneal fat has been exposed.

The *regional* method of producing local anæsthesia has a very limited application in general practice. It consists in anæsthetizing the nerves supplying the field of operation by injecting the novocaine solution either into, or immediately around, the nerve trunks. It can be conveniently applied to operations on the fingers or toes. A zone of infiltration carried around the root of a finger or on each side of the base of a metatarsal will give complete anæsthesia of the digit. By this method amputations and the hallux valgus and hammer-toe operations are conveniently carried out. The ulnar nerve may be injected at the elbow for operations on the medial side of the hand, but injection of other large nerves should not be attempted in the circumstances under discussion.

It is advisable to wait for five minutes or so in order to give the anæsthetic time to produce its full effect. Certain details of technique in the operative procedure require special mention. It is of the first importance that all manipulations should be carried out as gently as possible. It is obvious that the effect of pulling or of blunt dissection may extend beyond the anæsthetized area, and produce discomfort in the surrounding parts. Every care must be employed to secure complete hæmostasis, since after the constricting effect of the adrenalin wears off there is a possibility of reactionary hæmorrhage. Perfect asepsis is, of course, essential, although infection does not appear any more liable to occur with a local than with a general anæsthetic.

long bones should be X-rayed as well as the spleen. Large doses of radium, applied to the spleen, have also given good results in the treatment of myeloid leukaemia, a number of patients who were severely ill having lived for several years after radium treatment — (*Paris Médical*, December 5, 1925, p 468)

A Method of Softening Scar Tissue.

W Stoeltzner has carried out a number of experiments with regard to the softening of scar tissue, employing, among other substances, thiosinamine, potassium, choline, and urea. He reports that the best results were obtained with a concentrated solution of urea, injected under non-adherent scars. It must, however, be used with caution, as it caused, in some cases, necrosis when injected under an adherent scar — (*Munchener Medizinische Wochenschrift*, December 11, 1925, p 2133)

Treatment of Chronic Nasal Diphtheria.

A Abraham points out that so-called ozæna may be in many cases chronic nasal diphtheria. He gives particulars of thirteen cases which (with one exception diagnosed as chronic rhino-pharyngitis sicca) were diagnosed as cases of atrophic rhinitis, but bacteriological examination revealed all of them as being chronic nasal diphtheria. Of these cases only two were stated to have had diphtheria. The cases were all treated by the injection for three days of 4,000 to 6,000 units of diphtheria anti-toxin, along with twelve to fourteen injections of an autogenous vaccine prepared from the nasal discharge, which contained other organisms as well as the diphtheria bacillus. Irrigations of the nose with $\frac{1}{4}$ per cent chloramine solution were also carried out — (*Deutsche Medizinische Wochenschrift*, December 18, 1925, p 2114)

Treatment of Bone and Joint Tuberculosis.

H Keller notes that the consensus of opinion is that bone and joint tuberculosis are caused by a tuberculous focus located elsewhere in the body, which only through one cause or another finds the vicinity of the joint the most favourable medium for invasion and development. X-ray examination of the chest should always accompany the X-ray examination of the joints in tuberculous affections of the latter. Therapeutic measures directed towards curing the joints alone are only part of the treatment. Radiation of the chest should be tried in those cases where enlarged lymph nodes in the chest accompany the joint disease, as well as the other therapeutic measures which are ordinarily applied in cases of tuberculosis — (*Medical Journal and Record* (New York), February 3, 1926, p 169)

Reviews of Books.

The Book of Prescriptions By E W LUCAS and H B STEVENS
Eleventh edition Pp 382 London J and A Churchill
10s 6d net

WE are under the impression that the first edition of this most useful book was published by John Churchill in 1854 and not in 1856, as stated on the reverse of the title-page of the copy under review. In any case, Henry Beasley's "Book of Prescriptions" continues an honourable and fertile career under its present editors. It is so well known to practitioners wherever the English tongue is spoken that it requires no description. The new edition is brought thoroughly up-to-date, and what was lacking in this respect in the last edition is now made good. Insulin and colloidal therapy are dealt with in a practical manner, the prescriptions given for the use of colloidal drugs are sure to be appreciated. Pains have been taken to clearly indicate all the B P and B P C articles and preparations which come within the scope of the Dangerous Drugs Act. The work of the publishers has been carried out in the admirable manner which is customary to them. It is a valuable book for the prescriber's desk.

Pathology of Tumours By PROFESSOR E H KETTLE Second
Edition Demy 8vo Pp 285 London H K Lewis & Co,
Ltd 12s 6d net

WE welcome the second edition of this excellent work. The book is thoroughly well thought out, and planned for the teaching and instruction of students. It contains clearly and simply stated all the broad elements of a subject which is very difficult to classify, especially as our increased knowledge of tumour formation always leads to that indistinguishable borderline which lies between innocent and malignant tumours. The subject is further complicated by the presence of such tumours as the melanoma, endothelioma and cylindroma. The illustrations throughout the work are of a high order, aptly chosen to illustrate the subject matter, and amply cover the whole range of the subject. It is curious to find in a small book on pathology such an excellent summary of the treatment of tumours, and to read these four and a half pages would well repay anybody. The strictly local nature of the malignant tumour at its commencement is insisted upon, together with the advantages of really early operation before metastases have occurred. The objects of operation, the pros and cons of frozen section examination at the time of operation, are dealt with, and with the conclusions drawn we cordially agree. There is also a short section given to the experimental study of cancer, which has become so important and extensive as almost to require a specialist of its own to deal with it.

Preparations, Inventions, Etc.

ANGIOLYMPHE.

(London Messrs Chas Zimmermann & Co, Ltd, 9 & 10 St Mary-at-Hill, E C 3)

This preparation, which is for the treatment of tuberculosis, is entirely of vegetable origin, free from alkaloids and mineral matter, and without preservatives of any kind. It is sterile, stable, and non-toxic, and causes no reaction. Its effect is apparently so to modify the soil that it becomes untenable to the tubercle bacillus, without, however, having any direct effect on the organism. It is given by injections into the gluteal muscles. The preparation deserves to be given a thorough trial in suitable cases.

MEDICATED SOAPS

(London Vinolia Company, Limited, Lever House, Blackfriars, E C 4)

The medicated soaps submitted to us by the Vinolia Company comprise the following "Baby Soap," in which the lather produced is very soft and soothing, due to the special base employed and to the addition of petrolatum before milling, "Carbolic Health Soap," a neutral soap containing a definite proportion of phenol, "Coal Tar Soap," a similar soap containing cresylic compounds with alcohol, "Medicated Cream Soap," containing boric acid, calamine, zinc oxide, and lanolin, incorporated with a bland base, "Sulphur Soap," containing a definite proportion of colloidal sulphur. Samples of these soaps will be sent to members of the profession on application to the manufacturers, mentioning THE PRACTITIONER.

LARGE WATER BISCUITS

Glasgow and London Messrs Macfarlane, Lang & Co, Ltd. We have received a box of the "Large Water Biscuits" manufactured by this well-known firm. The biscuits are crisp and of excellent flavour, and, in addition to their more ordinary uses, may be suggested for the dietary of invalids in whom bread causes flatulent dyspepsia.

THE CONSTANTIA TRUSS

(Liverpool Messrs Alexander & Fowler, 104 and 106 Pembroke Place)

It is well known that if the hand be placed with the thumb on the funicular ring after a hernia has been reduced, with the fingers round the pelvis in a line following the positions of a truss spring, the

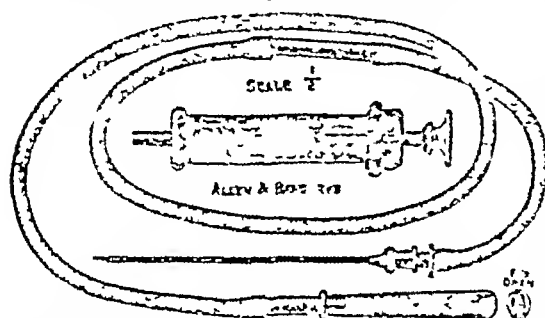
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most difficult hernia is controlled. The Constanta truss is an ingenious mechanical appliance, intended to act as efficiently as the human hand. The band is made of steel covered in soft material, and it does not compress tightly, the necessary pressure to hold the hernia being given by means of a spring working independently at the end of the band, and its position may be altered to give pressure on various points of the pad. This truss seems to be a distinctly useful appliance which eliminates most of the faults of other types.

A SIMPLE OUTFIT FOR PARACENTESIS THORACIS

(London Messrs Allen & Hanburys, Ltd, 48 Wigmore Street, W 1)

Dr F G Crookshank has devised a simple outfit for paracentesis thoracis, which should prove very useful to many practitioners. It



is a portable outfit, made up of a record syringe with assorted needles, for exploratory puncture of the chest, and is provided with an indiarubber tube and teat valve so mounted that evacuation, if

judged necessary, can be performed immediately without withdrawing the needle and making another puncture with a trocar fitted to a complicated aspirator.

NEW PREPARATIONS

(London Messrs Parke, Davis & Co, Beak Street, Regent Street, W 1)

Bismuth Salicylate Suspension in Ampoules—These ampoules each contain 2 grains of bismuth salicylate, suspended in pure olive oil, to which is added 10 per cent of camphor and of creosote, which drugs tend to reduce pain or irritation at the site of an injection, in the treatment of syphilis by bismuth salts.

Metagen and Cod Liver Oil Emulsion—Metagen is a physiologically tested preparation of the several vitamins of vegetable origin, and should be a valuable auxiliary to cod-liver oil, which does not contain all the vitamins.

Digifortis—This is a physiologically standardized digitalis preparation, and, it is stated, every possible precaution has been taken to ensure its therapeutic efficiency, as digitalis preparations are notoriously liable to deteriorate. The average dose of digifortis is 8 minims, two or three times daily.

Tablets of Aspirin Compound with Dover Powder, Modified—As the formula suggested in 1921 by Sir G Archdall Reid comes within the scope of the Dangerous Drugs Act, these tablets have been introduced, containing rather less Dover powder (2 grains),

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and more aspirin (6 grains), with phenacetin ($2\frac{1}{2}$ grains), so as to be outside the scope of the Act

ISACEN

(London The Hoffmann-La Roche Chemical Works, Ltd ,
7 and 8 Idol Lane, E C 3)

Isacen is a new synthetic, non-toxic purgative—diacetyl-dihydroxyphenyl-isatine, and is issued in small phials, each containing forty granules of 5 mgm ($1/13$ grains) each. A dose of 2 to 4 granules is generally sufficient to produce stimulation of the mucous membrane of the large intestine, and in cases of mild constipation, one granule will produce a laxative effect. It is unaccompanied by intestinal pain or discomfort.

"THE BOTTLE AND GLASS CONTAINER BULLETIN"

(London The United Glass Bottle Manufacturers, Ltd , 40-43
Norfolk Street, W.C 2)

This "Bulletin" is a well-produced little publication, with an amusing cover in colours by Mr G E Studdy. Among the bottles and containers illustrated in it are the U G B medical bottle, the method adopted in the manufacture of which would seem to ensure extreme accuracy, and the U G B tablet bottle, a type of bottle which should make the old-fashioned pill-box out of date.

SIL-AL

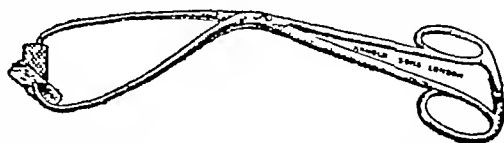
(London Mr Lionel Cooper, Pharmaceutical Agent, 41 Great
Tower Street, E C 3)

Sil-Al is the name given to a preparation of aluminium silicate, physiologically pure. The specimen sent to us conforms to the usual tests, and may be prescribed with confidence where indicated. The usual dose is 60 to 90 grains, given in half a tumbler of water, before meals.

TONSIL COMPRESSION FORCEPS

(London Messrs John Bell & Croyden, Ltd , incorporating Arnold
& Sons, 50 Wigmore Street, W 1)

Dr C D Agassiz has invented an instrument designed primarily for use in enucleation of tonsils by the blunt guillotine. The square-ended blade is fitted with a small piece of rubber sponge, and a small gauze bag made with a purse-string thread at the neck is slipped over the sponge at the time of operation, and the thread pulled tight.



The other blade is covered with a piece of rubber tubing. The instrument is applied immediately after the enucleation of the tonsil—the sponge covered blade to the tonsil bed and the other blade behind the angle of the jaw. A clear field for the removal of the second tonsil is then left, and when both are applied, hæmorrhage is prevented. Two instruments, right and left, are required for each operation. In emergency, in case of secondary hæmorrhage, this instrument may also be useful.



CHRONIC INVALIDISM

ATTENTION has recently been drawn to the large amount of chronic invalidism of vague character, for which no obvious cause can be assigned. On tracing the history of such cases, it will often be found that continuous good health became gradually broken by more and more frequent intervals of malaise, slight depression, and inertia.

It seems certain that we are here confronted with instances of latent infection from sites where bacteria are protected from the activity of phagocytes. Frequently, in these cases, the blood shows a polymorphonuclear leucopænia and an increase in the number of eosinophile cells. Both the earlier symptoms and the latter invalidity would seem to be due to the absorption of toxic protein substances resulting from bacterial autolysis.

The tonsils, gums, and certain other parts are not infrequent sites of such infective processes, but probably the commonest by far is the large intestine, under the influence of chronic intestinal stasis.

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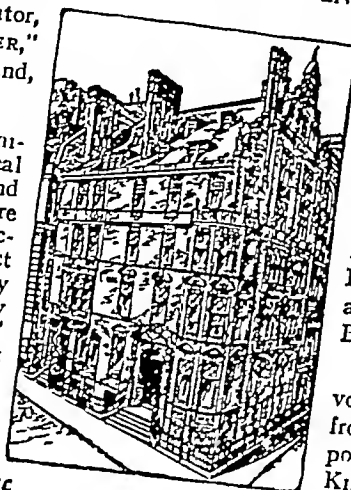
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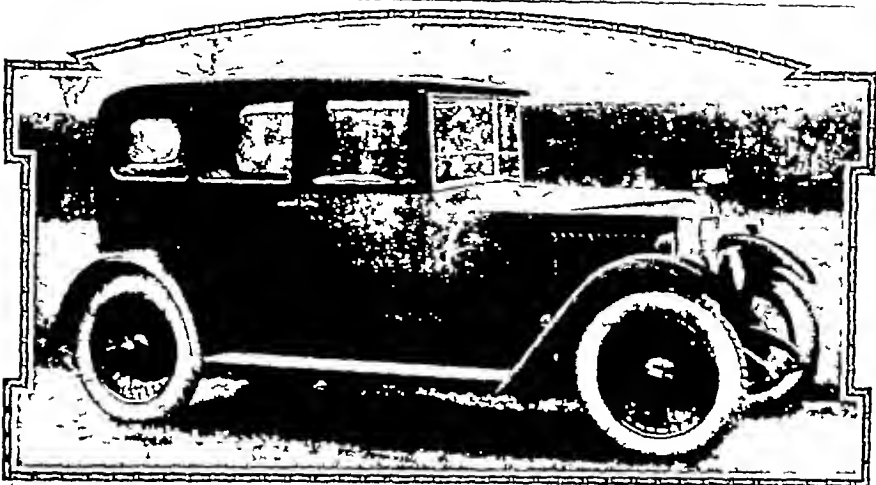
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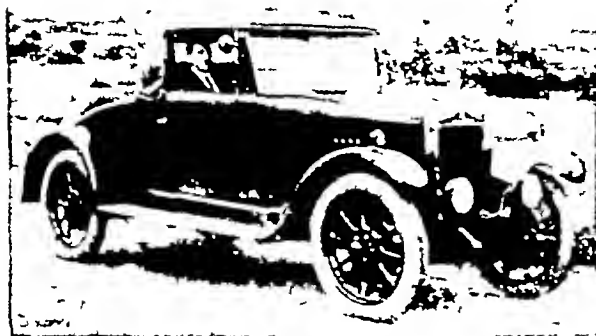
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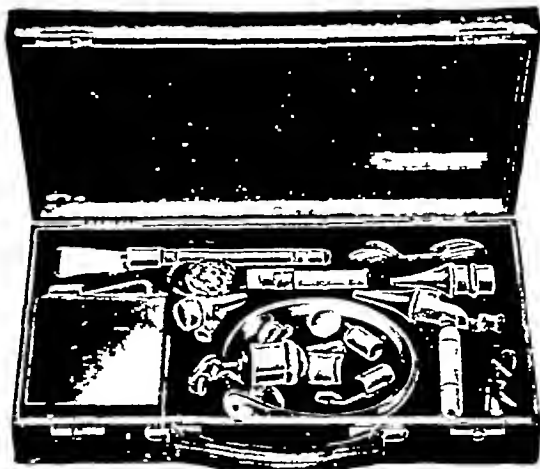
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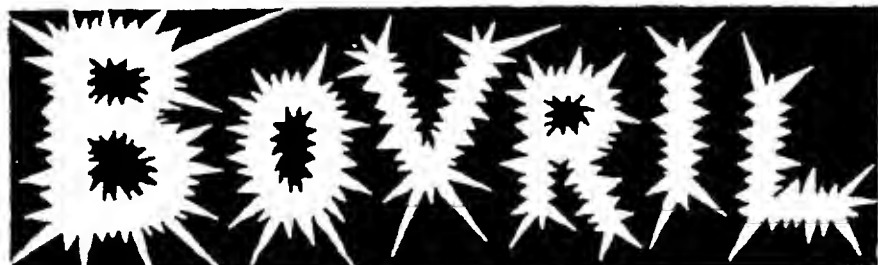
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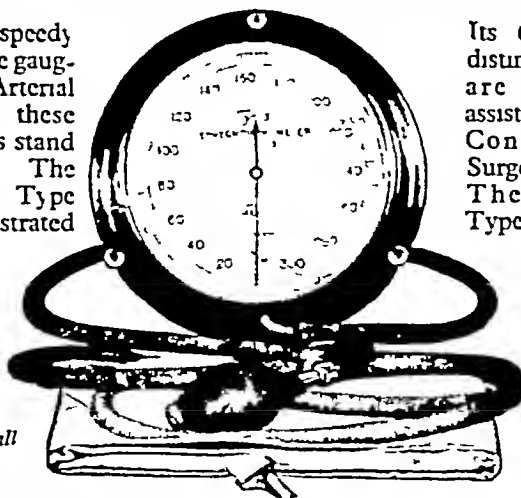
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BELL, A C H, M.B., B.S. Lond., F.R.C.S. Eng., appointed Registrar, Queen Charlotte's Maternity Hospital.

BOWEN-JONES, E, M.R.C.S., L.R.C.P., appointed Certifying Factory Surgeon for Northleach District (Gloucester)

BUCK, HELEN R. B., M.B., B.S. Lond., appointed Resident Assistant Medical Officer, Manchester Booth Hall Hospital for Children.

CODY, W. E., L.R.C.P. Lond., M.R.C.S., appointed Certifying Surgeon under the Factory and Workshop Acts for the Twickenham District of the County of Middlesex.

CROCKETT, MARGARET, M.B., Ch.B. Glas., appointed Temporary Resident Assistant Medical Officer, Manchester Booth Hall Hospital for Children

CURNOW, R. N., M.B., B.S. Lond., appointed Deputy M.O.H. for Derbyshire

FRIZELLE, E. R., M.B., M.Ch. Belf., F.R.C.S. Ed., appointed Honorary Assistant Surgeon to Southport Infirmary

GRIFFITHS, T. A., M.B., Ch.B. Liverp., appointed Certifying Factory Surgeon for Towyne, Merioneth

GROSE, G. N., B.Chir., M.R.C.S., L.R.C.P., appointed Assistant Resident Medical Officer, Queen Charlotte's Maternity Hospital.

HAYWARD, A. W., M.R.C.S., L.R.C.P., appointed Certifying Factory Surgeon for the Stock District, Essex.

HERBERT, S., M.D. Vienna, L.R.C.P. Lond., M.R.C.S., appointed by Board of Control under Mental Treatment Act (1930) for Manchester

HERITAGE, KENNETH, M.S. Lond., F.R.C.S. Eng., appointed Surgical First Assistant and Registrar, London Hospital.

HOOD, W. D., M.B., Ch.B., D.P.H., appointed Medical Inspector of Factories under the Factory and Workshop Acts.

HUNT, T. C., D.M. Oxf., M.R.C.P. Lond., appointed Hon. Asst. Physician, Queen Charlotte's Maternity Hospital.

JARRETT, R. F., F.R.F.P.S.G., appointed Medical Superintendent, Kent County Institution for Mental Defectives, Teybourn Grange, near Maidstone

LAWRENCE, N. E., F.R.C.S. Eng., L.R.C.P. Lond., M.R.C.S., appointed Orthopaedic Registrar to Salford Royal Hospital

MASSON, H. F., M.B., Ch.B. Edin., appointed Certifying Surgeon under the Factory and Workshop Acts for the Dingwall District of the County of Ross.

ORR-EWING, A., M.B., Ch.B. Camb., appointed Certifying Factory Surgeon for Rowfant, Sussex.

PARSONS, MISS F. M., M.R.C.S., L.R.C.P., appointed District Resident Medical Officer, Queen Charlotte's Maternity Hospital.

PEILL, S. G., M.B., Ch.B. Edin., appointed Certifying Factory Surgeon for Teyburn, York.

POLSON, CYRIL J., M.D. Birm., M.R.C.P. Lond., appointed Lecturer in Pathology, University of Leeds, and Pathologist to St. James's Hospital, Leeds.

ROLFE, D. A., L.R.C.P. Lond., M.R.C.S., appointed Certifying Factory Surgeon for Llangeenoch, Carmarthen.

SAYLE, T. O., M.B., B.S. Melb., appointed Resident Medical Officer, Freemasons Hospital and Nursing Home, Fother Road, S.W.

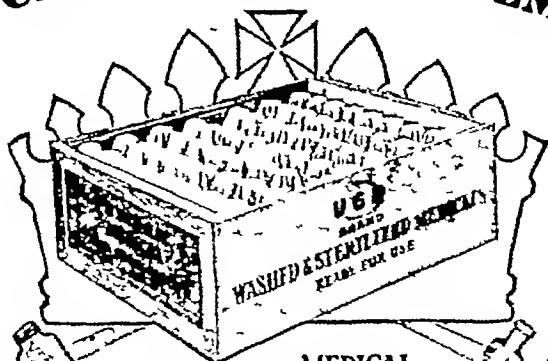
STANSFIELD, F. R., M.B., B.S. F.R., appointed Senior Resident Medical Officer, Queen Charlotte's Maternity Hospital

STIVEN, H. E. S., M.D., B.S. Cal., appointed P.M.O. to the new Hospital, Cairo

STRANG, REGINALD S., M.B., Ch.B. Glas., appointed House Surgeon, Square Throat, Nose and Ear Hospital.

WALLACE, W. H. S., L.R.C.P. Lond., M.R.C.S., appointed Assistant Resident Medical Officer, City of London Maternity Hospital.

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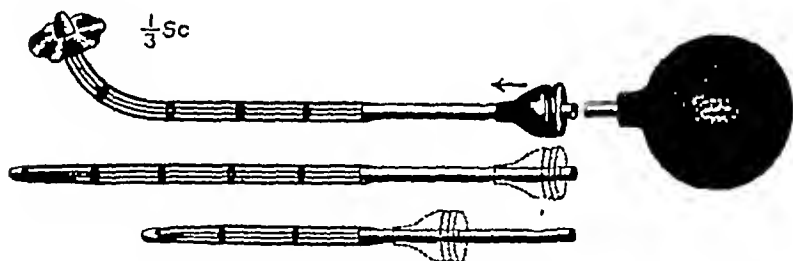
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Original articles, clinical lectures, medical society addresses, and cases are invited, but are accepted only upon the distinct understanding that are published exclusively in "THE PRACTITIONER." Unaccepted MS. will be returned

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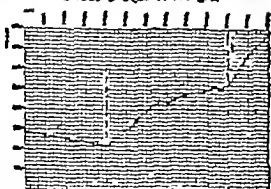
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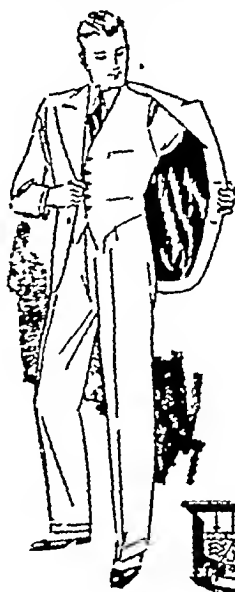
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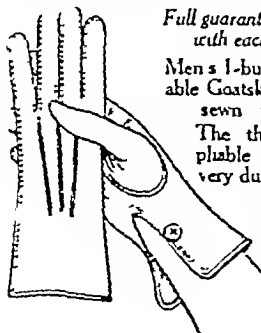
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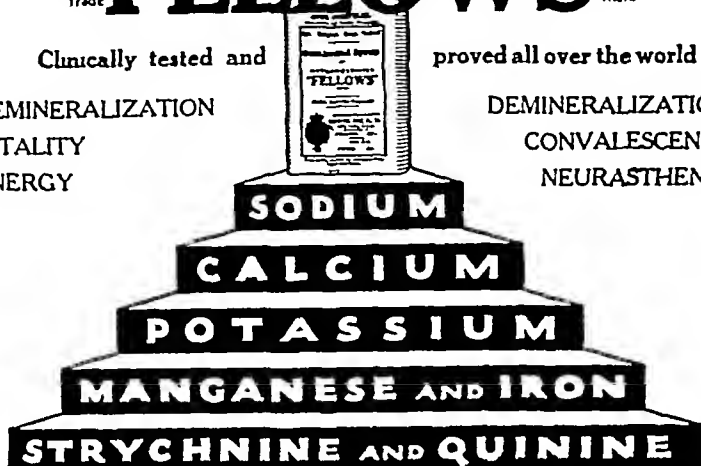
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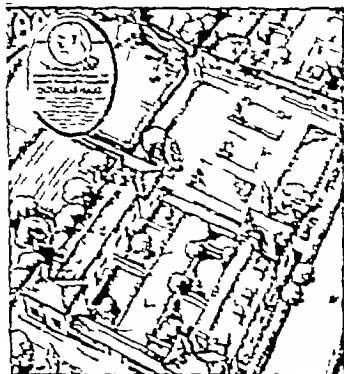
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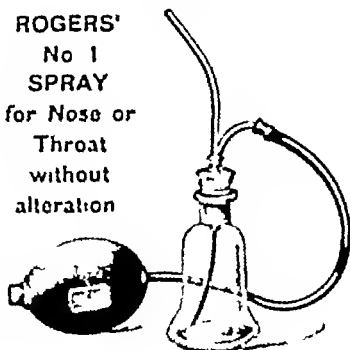
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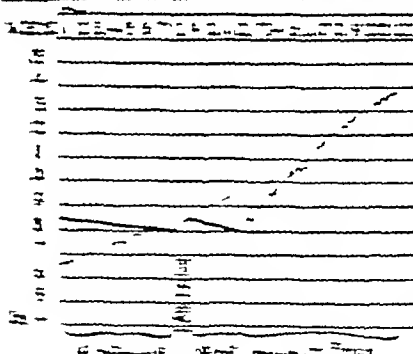
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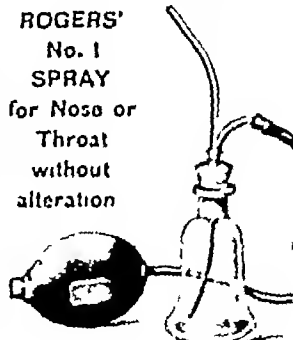
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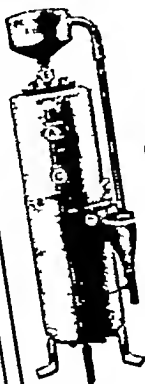
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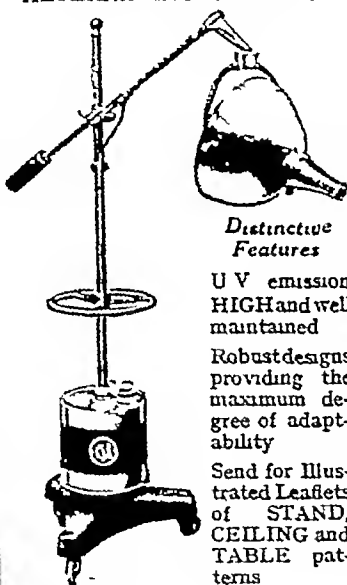
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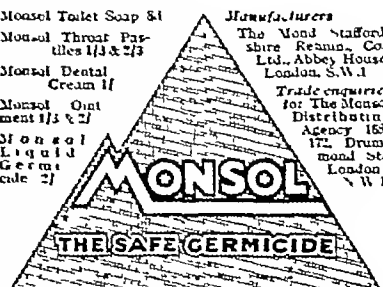
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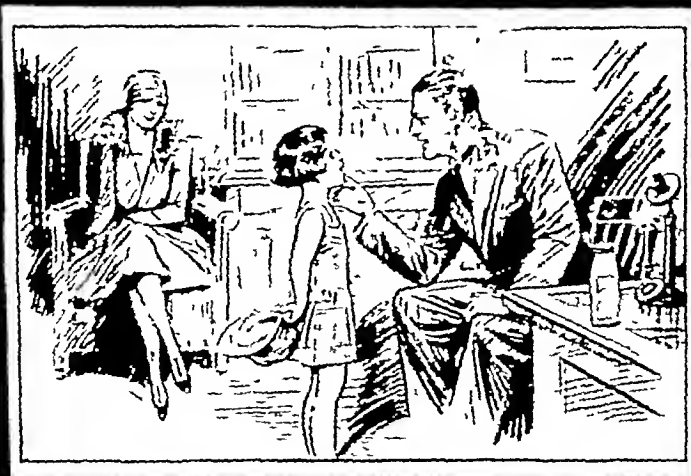
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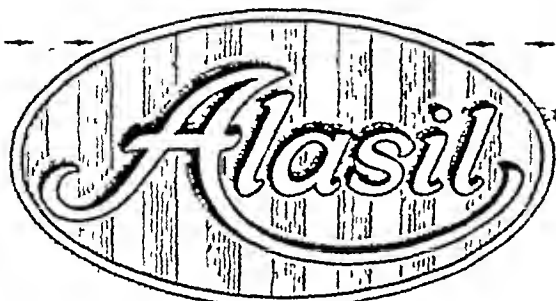
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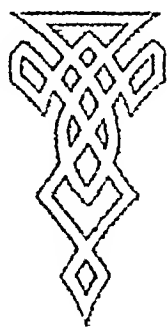
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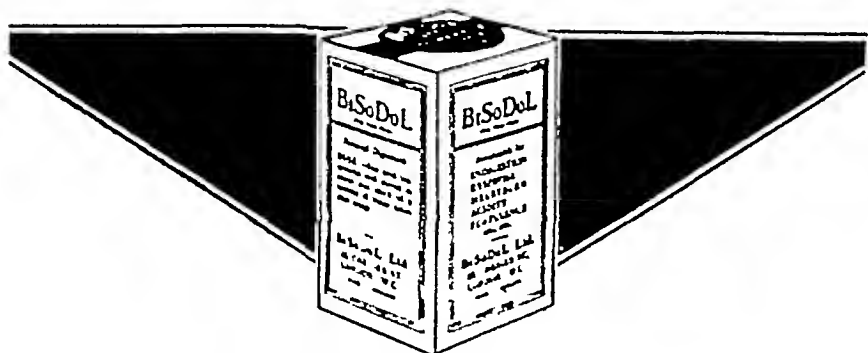


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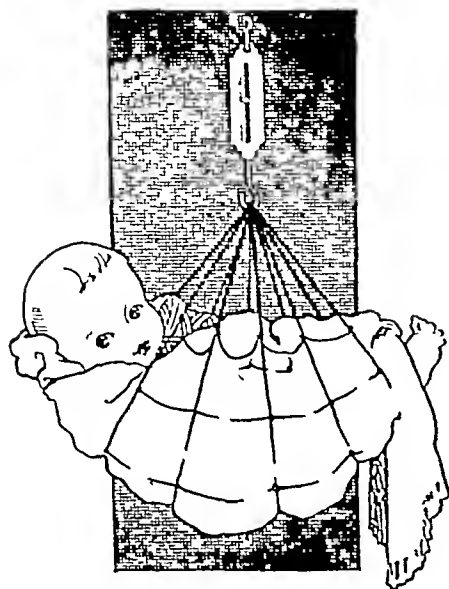
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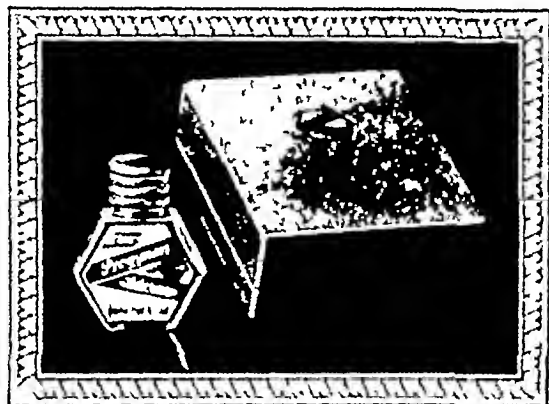


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JULY

1930

Diseases of Infancy and Childhood: Introduction.

By SIR HUMPHRY ROLLESTON, BART, G C V O, K C B.
M D, F R C P

*Physician-in-Ordinary to H M the King, Regius Professor of Physics
University of Cambridge*

THE medical aspects of infants and children differ in some respects from those of adult life. Birth entails a sudden change of environment, attended by special dangers, and the evil influence of factors active during foetal life are naturally then prone to become obvious and even serious. The care of the expectant mother during pregnancy, now recognized by antenatal measures, and skilled supervision during parturition and in early infancy are of the greatest importance. In support of this the following figures may be quoted: the United States Census for 1921 showed that out of every 100 deaths during the first year of life, forty-seven, or nearly half, were due to malformation, injury at birth, or inadequate equipment to meet the demands of independent existence, according to Eardley Holland more than half the cases of foetal death or still-birth are due to preventable causes equally divided between faulty pre-natal treatment and imperfect management of delivery. It is gratifying to note that there has been

THE PRACTITIONER

much improvement with regard to the survival of infants, as shown by the official figures in this country; whereas in 1871-80, out of every 1,000 infants born, 149 died under one year of age, this mortality rate had fallen in 1928 to sixty-five. There is, however, much more to be done. Prevention, the ideal of modern medicine, is specially urgent in infancy and childhood, for it is the first step in the wrong direction that really tells. As it has been estimated that about 80 per cent of the population enter the world without any existing disease, there is a crying need for the protection of infants from evil influences, among which improper feeding and errors in general hygiene are outstanding. Education of present and future mothers in mothercraft is therefore an essential factor in preserving the health of the nation.

As already mentioned, the diseases of infants and children differ in some respects from those of adults; congenital malformations and disorders play a more prominent part in the clinical picture; some infections are almost confined to early life; others are fraught with more serious results than in later life—for example, acute rheumatism—or leave behind them an indelible impress of infantilism; on the other hand, some of the disorders specially frequent in later life, such as high blood-pressure, arteriosclerosis, gall-stones, and many forms of malignant disease, are exceptional in early life. Further, some diseases, such as tuberculosis, common to all stages of our earthly pilgrimage, present different forms in early and in later life. Children react more acutely to infections and, generally speaking, recover more rapidly than their elders, the *medicatrix naturæ* fortunately comes to their rescue in fuller measure than to their parents. As infants and children are more simple in some respects, less complex mentally, and physically free from the effects of the long wear and tear of life and of focal infections which

DISEASES OF INFANCY

tend to become more frequent as the years pass, it might be anticipated that the practice of medicine among them would be less difficult than among adults. Thus, however, is far from being the experience of men entering general practice straight from a medical school, who, though endowed with the confidence of a recent diploma, soon realize that they have still much to learn. This no doubt is partly due to the already overcrowded state of the curriculum and to the resulting limitations of time which render it difficult for them to take full advantage of the children's departments, attendance at which is now obligatory by the regulations of the General Medical Council. But apart from this, there are inherent difficulties in dealing with the diseases of infants and young children; as in veterinary medicine and in dealing with persons who speak no common language, the help derived from an account of pain and subjective symptoms must in the very young be dispensed with, and the case history may in the absence of the parents have to go by default. Changes in the manifestations occur more rapidly, and the significance of some signs, such as nervous disturbance, temperature, and pulse, must be evaluated on lines somewhat different from those of adults.

As compared with other special departments of medicine, particularly the surgical ones requiring a high degree of manipulative skill, pædiatrics is in a state of transition, it is, indeed, in much the same position as that of ophthalmology fifty years ago, then practised by general surgeons. Many physicians, chiefly known for their work on diseases of children, are also attached to general hospitals. The public always wants a "specialist", forty years ago a physician equally eminent in diseases of children and in general medicine—said to be the late Sir James Goodhart—humorously described his interview with an

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anxious mother who, incidentally, informed him that he was a specialist for children between such absurdly narrow limits of age as five and eight years! Present conditions make it highly probable that the number of consultants who devote themselves entirely to children's diseases will continue to increase with the advance of all the branches of science, and, in spite of any fear that this may lead to some restriction of their mental horizon, there can be no doubt that the more intensive study will, as in other specialties, lead to a more rapid extension and advance of the science and art. On the other hand, a knowledge of infants' and children's diseases is on a somewhat different footing from that of recognized specialties, for it must be possessed in a greater degree than that of the specialties by everyone in general practice, the position, indeed, is much the same as in general medicine.

This Special Number of *THE PRACTITIONER* on the diseases of infants and children contains a number of authoritative articles dealing with very various subjects, some of fundamental importance, such as feeding and dyspepsia, others of special interest, such as congenital anaemia and pink disease. They surely do not need any introduction to the general practitioner, among whose most urgent problems of every-day medical practice are those connected with children's ailments.

Infant Feeding : The Amount of Food Required.

By LEONARD FINDLAY, M D , D Sc , M R C P , F R F P S
*Professor of Paediatrics, Glasgow University , Physician to the Royal
Hospital for Sick Children, Glasgow*

INANITION a Cause of Wasting.—It will generally be admitted that to the breast-fed child a milk is being supplied specially designed for its needs and that bad results usually depend on errors of technique, e.g. irregularity of feeding or, and probably much more frequently, on an insufficient supply of milk. Though in the case of the bottle-fed child most attention is paid to the composition of the food, and the devices to modify this are almost legion, I believe that in cases of non-success the same errors are chiefly at play, viz. —irregularity of feeding and insufficiency of food.

Differences between Human and Cow's Milk.—It must, of course, be admitted that there are marked differences between breast milk and the substituted cow's milk, and that the latter might seem to require some modification before being suitable for infant consumption. There is little wonder, then, that much time and trouble have been spent on this aspect of the question. But it may, I think, be stated quite categorically that the differences between these two types of milk are too fundamental to permit of the possibility of making the one variety anything like the other, except in so far as the gross quantities of the proximate food principles are concerned. To talk of humanizing cow's milk is a mere phantasy. We know, for instance, that protein owes its virtues as such

to the amino-acids of which it is composed, and these are fundamentally very different qualitatively in the two varieties of milk. In order to convert the one into the other it is necessary that it be broken down into its component parts (amino-acids) and resynthesized in a very selective fashion, as can be done alone by the living organism during the processes of digestion and absorption. The amounts of the different salts, too, which are of such great importance in nutrition, vary so much, some being more abundant in cow's milk and others being more abundant in human milk, that to bring even these into line would be a veritable acrobatic feat.

Undiluted Cow's Milk a Satisfactory Substitute.—Fortunate it is, therefore, that the average child's physiological powers are able to deal with unmodified cow's milk, and quite satisfactory, in fact good, results are usually obtained provided that sufficient is administered. It is with this question of the amount of food required by the growing infant that I wish to deal in the present article, for I believe that non-attention to this factor more than to any other is the cause of much of the disease during infancy. In the first place, by attention to this matter it is possible to hinder many well babies from becoming ill. The wasting is by itself sufficiently grave, but by rendering the child more susceptible to infection (otitis media, bronchopneumonia and pyelo-nephritis) a not infrequently hopeless and fatal state of matters is produced. Hence a knowledge of the food requirements of the infant is a matter of paramount importance, so that we may be able to say if a child is receiving sufficient, and if not, be able to apply the remedy.

Function of Food.—In order that a proper understanding of the matter may be had, it is first essential to appreciate the purposes which food serves. The body may be likened to an engine, and a very efficient

INFANT FEEDING

engine it is, since it keeps on working day and night throughout life without cessation, and at the same time repairs any wear and tear. And, like an engine, it requires fuel for its working. The food of the infant is comparable to the fuel of the engine, yet, if one may judge from the amount supplied by some physicians to the infants under their care, they must think they are dealing with a magic machine, which can perform its work on air and water alone. It should be remembered, too, that in the case of the infant and growing child the body, an engine as we may call it, increases its size many times, and food or fuel for this purpose must also be supplied.

Thus, food sufficient for the natural functions to repair wear and tear, to allow of growth and incidentally to provide for waste must be supplied, and unless this is done only one result can follow. a result which is commensurate with the shortage. If there is enough for the vital functions and to repair wear and tear there certainly will be no growth, but there may be no loss of weight, and even with less than required for these purposes the metabolic processes may work at a slower rate and still there be no loss in weight. If, however, there be not supplied sufficient for all these various purposes, then the infant will live on his own tissues, consume himself, and wasting is the inevitable result.

Symptoms of Inanition.—In general the symptomatology of inanition or starvation is a stationary weight or a loss of weight. In some instances the child may be quite contented and sleep as well as when he is given just enough food to supply the necessary energy for all purposes but growth, but if the deficiency in food exceeds this, then the child is unduly cross. After a feed he may fall asleep, but his sleep is light, he awakens easily and cries much before the next feed is due. It will be readily understood that any food given will be used for the most important functions first, e. g. supply

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cannot state too strongly that in the absence of physical signs of disease no conclusions should be drawn regarding the inability of the child to digest or absorb food, or regarding the presence of some latent mischief, e.g. tuberculosis, until the child has been given its quota of food

Amount of Food a Child Requires.—The earliest estimates of how much food a child should get were made from a study of the amount taken by a healthy breast-fed infant. The infant was accurately weighed before and after each feed and the increase in grams represented the number of ccm. consumed. This method has been employed by several workers, some of them, like Reyer, making observations on their own child. Camerer and Feer and Meyer have also supplied us with figures, and from these various studies the average daily quantity of milk consumed by the normal infant may be said to be the following —

1st week	-	-	0-16 ozs.
2nd „	-	-	17 „
4th „	-	-	20 „
8th „	-	-	27 „
14th „	-	-	28 „
20th „	-	-	30 „
20th „	onwards		35 „

By converting these quantities of milk into their caloric values Rubner and Heubner laid down the rule that the average nutritional requirements of the normal infant were during the 1st 3 months 100 calories per kilo body weight, during the 2nd 3 months 90, during the 3rd 3 months 80, and during the last trimester 70 calories per kilo. body weight. If one desires to work with the English instead of the metric system, then the child should receive 15 calories per lb. body weight for the 1st 3 months, 10 for the 2nd 3 months, 35 for the 3rd 3 months, and 30-32 per lb for the last

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3 months

CHART 2

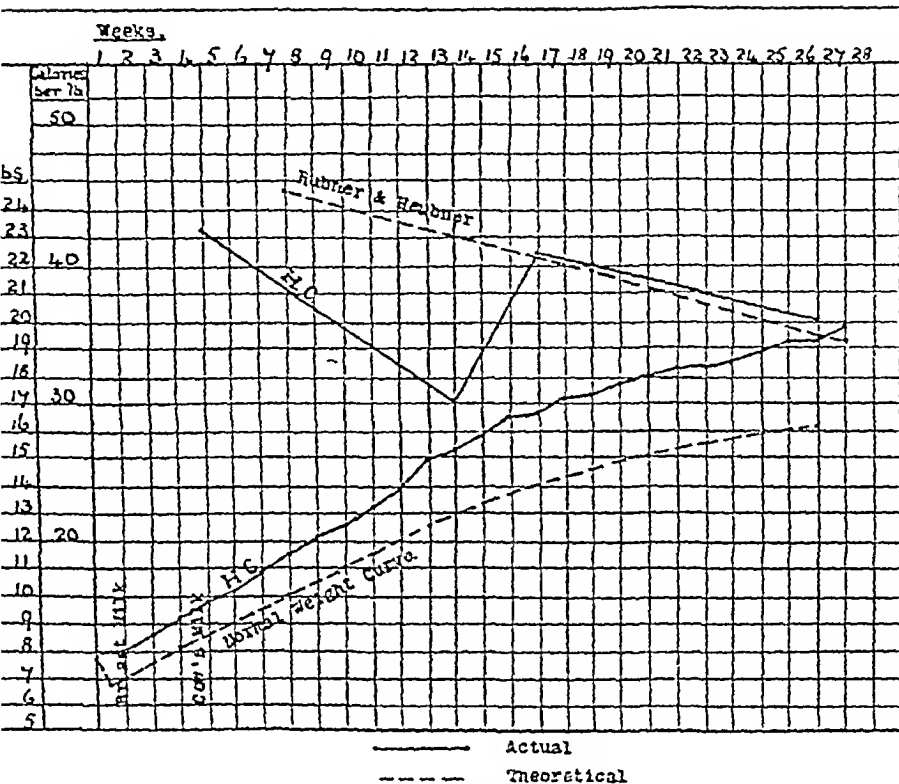


Chart contrasting theoretical requirements of Rubner and Heubner and the average weight curve with the actual amounts supplied and the actual weight curve in a healthy bottle fed child.

In the accompanying chart (No. 2) are represented graphically the daily amount of milk in calories per pound body weight, and the increase in weight in a very healthy bottle-fed child (H.C.) contrasted with the normal weight curve and the Rubner and Heubner scale of caloric requirements per pound body weight of the average child. The correspondence is seen to be very close. There is no doubt about the relative food requirements falling with age, in fact, during the third month the child seemed to be thriving with a relatively small intake, the child, however, increased

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during the first 3 months, 10 calories during the 2nd 3 months, and 35 calories per lb per day during the 3rd 3 months, and 30 to 32 during the last trimester of infancy. Now, as the average child is born with a weight of 7 lbs and increases in weight $1\frac{1}{2}$ lbs per

Chart 3

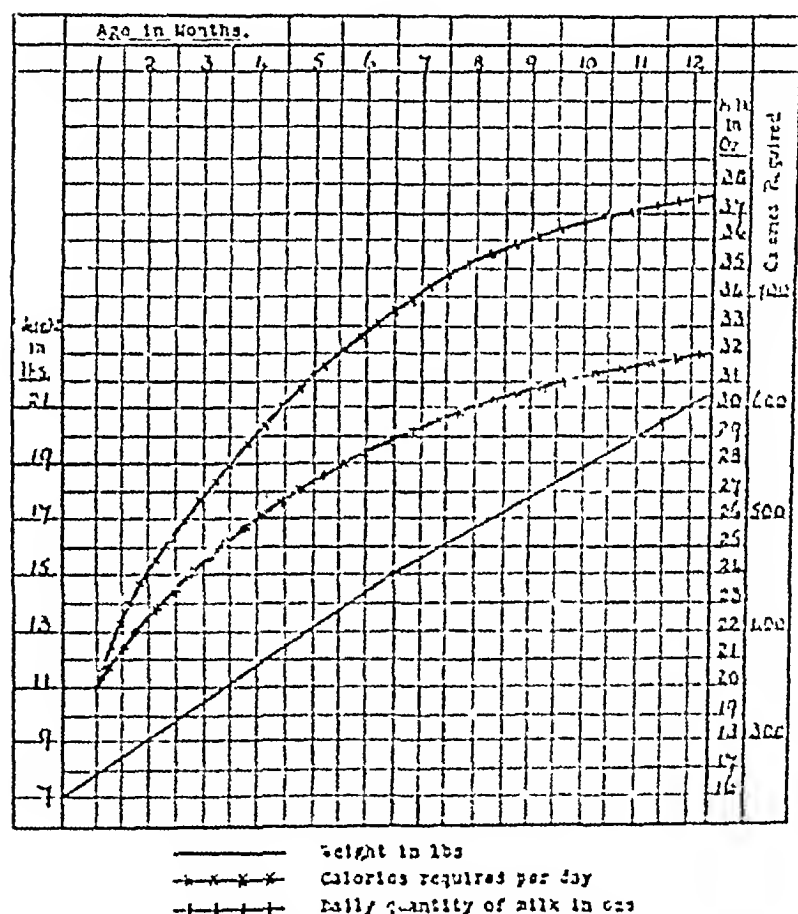


Chart showing calorie requirements, daily amount of undiluted cow's milk, and the average weight at different ages throughout infancy

month, it is easy to calculate what a child should weigh and how many calories per day he should receive at any given age.

Example.—Weight at birth is 7 lbs. Increase in

INFANT FEEDING

weight $1\frac{1}{2}$ lb. per month.

· Weight at 4 months is 7 lbs. $+ 4 \times 1\frac{1}{2} = 7 + 5\frac{1}{2} = 12\frac{1}{2}$ lbs

At this age child should receive 40 calories per lb

· Total calories required per day $= 12\frac{1}{2} \times 40 = 492$.

Since 1 ounce of milk represents 17 calories, child should receive $\frac{492}{17} = 29$ oz. milk per day.

If child be given 5 feeds daily each feed will be $\frac{29}{5} = 5\frac{4}{5}$ oz.

It may be decided that sugar be added to the feeds, and as 1 teaspoonful of sugar has a caloric value of 16 calories, which practically equals 1 oz of milk, every teaspoonful of sugar means 1 oz less of milk.

· With sugar the above feed would be $4\frac{4}{5}$ oz. milk $+ 1$ teaspoonful of sugar.

If one bears in mind the above few figures, i.e. birth weight, rate of increase of weight and caloric requirements for age as well as caloric values of the food, then the calculation is simplicity itself. However, I have thought that the accompanying chart (No 3), in which there are represented graphically the daily amount of milk in ozs, the daily caloric requirements and the weight for each month of life during the first year, may be found useful for ready reference.

A Record of Difficult Breast Feeding Cases.

By REGINALD C JEWESBURY, M A, M D, F R C P.

*Physician-in-Charge, Children's Department, St Thomas's Hospital,
Medical Director, Mothercraft Training Society, Highgate*

THE question of breast feeding often provides the medical practitioner with a problem which is not always easily solved. Is the mother to be advised to breast feed her baby or not? Probably at the back of every mother's mind there is the unconscious instinct that she ought to nurse her baby, and, in fact, most mothers nowadays give evidence of their willingness and desire to do so, but a variety of factors too often intervene which in many cases frustrate these good intentions. There can be no doubt about the intense feeling of satisfaction present in every mother who is able to nurse her baby successfully at the breast. Many mothers who, having been unsuccessful with breast feeding at the start, and having weaned their babies are disappointed at the result of artificial feeding, seek information on the re-establishment of breast feeding which, in some cases, can be accomplished satisfactorily. Doctors in the past have been at a great disadvantage because breast feeding and the feeding and management of the infant generally, is a subject about which they were unable to gain instruction in their student days, consequently the baby has been subjected to the care of the nurse who is insufficiently trained, and in many cases entirely opposed to breast feeding.

The modern mother of all classes is gaining a considerable amount of knowledge of "mothercraft," and it may be fairly said that the mothers of the better

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educated classes are becoming more and more willing and anxious to breast-feed their babies, and they naturally look to their doctors to guide them in this important matter. It should be then the duty of every medical practitioner to equip himself or herself with the necessary knowledge in order to give the mother the advice which she needs. Knowledge of this kind cannot do other than redound to the good reputation of the practitioner

It should be recognized that there is a great deal to be learnt about the feeding of the infant, whether this is done naturally or "unnaturally." Most of the failures in breast feeding are due to mismanagement, and could be avoided if the doctor in charge of the case takes the trouble to make a study of this very important subject.

It must be admitted that the mother's milk is the best food for the baby, and that there is no really satisfactory substitute for it. Are there cases in which the breast milk appears to disagree with the child in spite of the feedings being properly managed as to quantity and times? Such cases do occur, but they are very much less common than is generally supposed.

The composition of human milk with regard to its sugar, fat, and protein content is extraordinarily constant, both in the same mother, taken at different periods of lactation, and in the milk of different women. From a very large number of analyses which I have had made it appears that the fat shows the greatest variation, sometimes rising to as much as 7 per cent or more. When the breast milk contains an excess of fat it is liable to upset the baby. I have seen other cases in which the milk appeared to be perfectly satisfactory and yet for some unknown reason the child will not thrive on it, but these are unusual

It may have to be decided at the start, or even before the birth of the baby, whether or no the mother

is to feed it—too often it is thought that the mother is not strong enough to nurse her child, and she is persuaded by her relations not to undertake it. There is no evidence that breast feeding has any harmful effect on the mother, in fact in most cases it is quite the reverse. The mother should only be advised not to attempt to nurse her baby when she herself is suffering from any severe disease which causes progressive loss of weight. The French even advocate the nursing of babies by mothers suffering from active pulmonary tuberculosis, provided certain precautions are taken to protect the baby from infection, and it is claimed that these mothers suffer no ill effect nor do their babies.

The highly-strung, nervous type of mother met with more often among the educated classes, finds breast feeding a difficulty, but even she can in many cases be guided through her difficulties with a little tact and careful management, often much to the benefit of her nervous system. I have recently seen a mother aged 43 in whom it was possible to re-establish breast feeding after the baby had been weaned, and this was her first child.

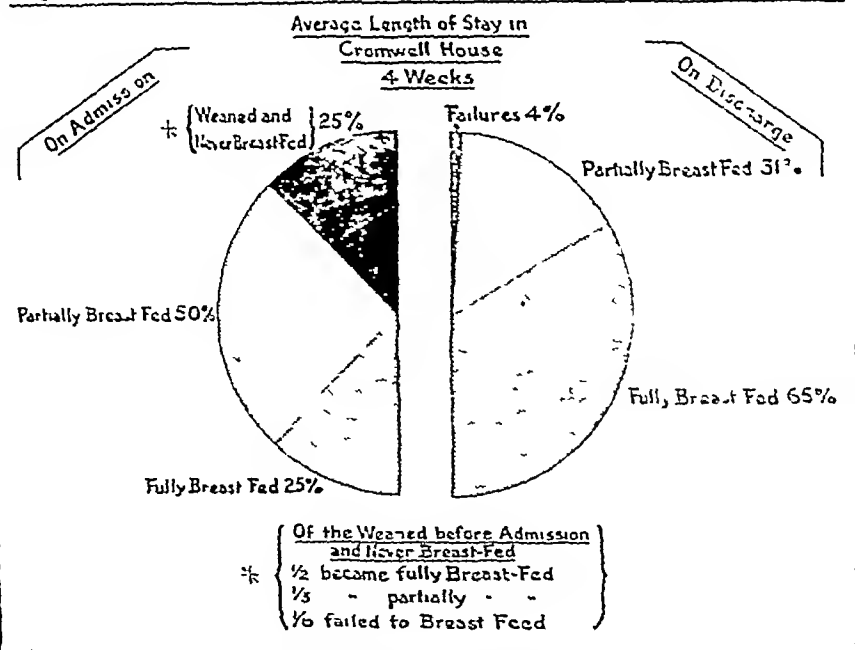
For the past ten years I have had the advantage of observing closely a large number of breast-feeding cases at the Mothercraft Training Society, Highgate, which was founded in this country by Sir Frederick Truby King, and I hope it may be of interest to give a summary of the cases dealt with. All the cases recorded were mothers and babies admitted as in-patients to the institution, and therefore it was possible to keep them under complete observation, with very careful records as to weights and measurements. A record is given of 250 breast-feeding cases which have been divided into five groups according to the chief difficulty concerned. This record of cases is of interest from two main points of view—first, it shows what

BREAST FEEDING CASES

are the chief difficulties met with in breast feeding; and secondly, it shows in what a large number of cases these difficulties can be overcome provided they are properly managed.

RECORD OF 250 BREAST-FEEDING CASES

Diagram showing Percentage of Fully Breast Fed Partially Breast-Fed Artificially-Fed Babies.



RECORD OF 250 CONSECUTIVE BREAST FEEDING IN-PATIENT CASES

On Admission —

63 were Fully Breast Fed (but not thriving)	25	2%
124 were Partially Breast Fed	-	49 6%
59 were Weaned	-	23 6%
4 were never Breast Fed	-	1.6%

250 Total

REASONS FOR ADMISSION.

(1) *Breast-Feeding Difficulties*, including *Baby* screaming at the breast, refusal to suck; milk said to

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<i>Causes of weaning</i>		<i>Result</i>	
3 vomiting	{	1 partially Breast Fed	
		2 fully B F	
3 stools	{	2 partially B F	
abnormal		1 fully B F	
4 milk "went"	{	2 partially B F	
		2 failures	
2 milk unsuitable	{	partially B F	
1 cracked nipple	{	fully B F	
2 Mother's illness	{	1 fully B F	
		1 failure	
1 milk watery	{	partially B F	
2 colic	{	1 partially B F	
		1 failure	
11 { 5 Mismanagement	Management	{ 4 Fully Breast Fed	
0 Irregular supply	Regulation		1 Partially B F
			4 Fully B F
			2 Partially B F
95 Total		95 Total	

Average length of stay 31 1 days

<i>On Admission</i>	{ 1 fully Breast Fed	11	<i>On Discharge</i>	{ Fully Breast Fed	13
	{ Partially B F	84		{ Partially B F	17
	{ Weaned	14		{ Failures	5
	{ Never B F	2			
		95			95

Group 5 *Baby Losing Weight* Total, 38

<i>Diagnosis</i>		<i>Treatment</i>	<i>Result</i>
38 {	19 Insufficient B M	Routine	{
	2 Never B F		
	17 Weaned — 2 days — 6 weeks		
			{ 19 fully Breast Fed
			{ 15 partially B F
			{ 1 failure

<i>Causes of weaning</i>		<i>Result</i>
5 losing weight	{	1 failure
		4 partially B F
2 Mother's ill	{	1 fully B F
		1 partially B F
3 Milk unsuitable	{	1 fully B F
		2 partially B F
2 Refusal to suck	{	2 fully B F
1 Milk went	{	1 fully B F
1 Flat nipple	{	1 fully B F
1 Insufficient B M	{	1 fully B F
2 Screaming at breast	{	2 partially B F

38 Total

38 Total

Average length of stay 28 days

<i>On Admission</i>	{ Fully Breast Fed	0	<i>On Discharge</i>	{ Fully Breast Fed	19
	{ Partially B F	14		{ Partially B F	15
	{ Weaned	17		{ Failures	1
	{ Never B F	2			
		33			35
		22			

BREAST FEEDING CASES

Treatment.—No doubt the successful results obtained in the majority of these cases were due to the fact that the mothers were away from their own homes and were completely supervised by skilled nurses. Many others were able to re-establish breast feeding at home under the directions given them (*vide* Chart 2). The ordinary routine directions given for increasing the supply of breast milk are as follows.—

(1) Put baby to *both* breasts every * hours, giving a little in a bottle after if necessary, but never give alternate feeds

(2) Take some outdoor exercise every day.

(3) A cold bath should be taken every morning. This cannot be commenced suddenly. It is a good plan to begin by standing in warm water and sponging the rest of the body with cool water, gradually getting it to cold; if the reaction to this is good, i.e., if after a brisk rub, the skin glows and is pink, a cool and then cold bath can be taken.

(4) See that the bowels are regular. A glass of cold water or a raw apple should be taken about one hour before breakfast, if there is any tendency to constipation. Try to right this condition by taking laxative foods—fruit, vegetables, brown bread, etc. If an aperient is necessary take 5–10 drops of liquid cascara evacuant 3 times daily.

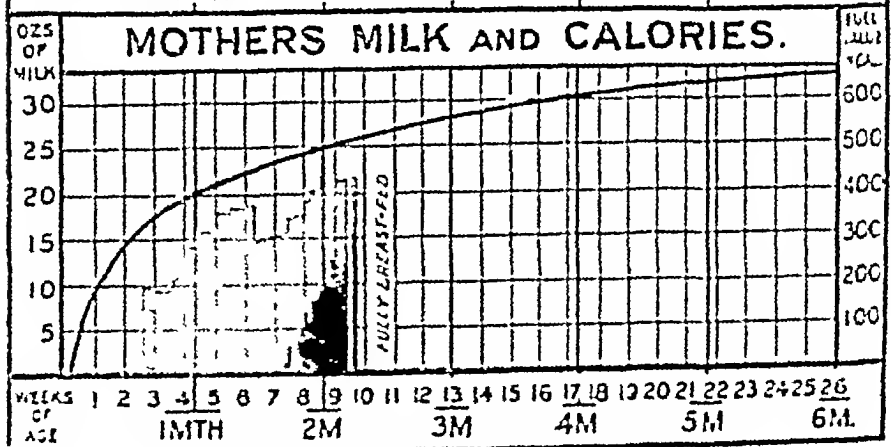
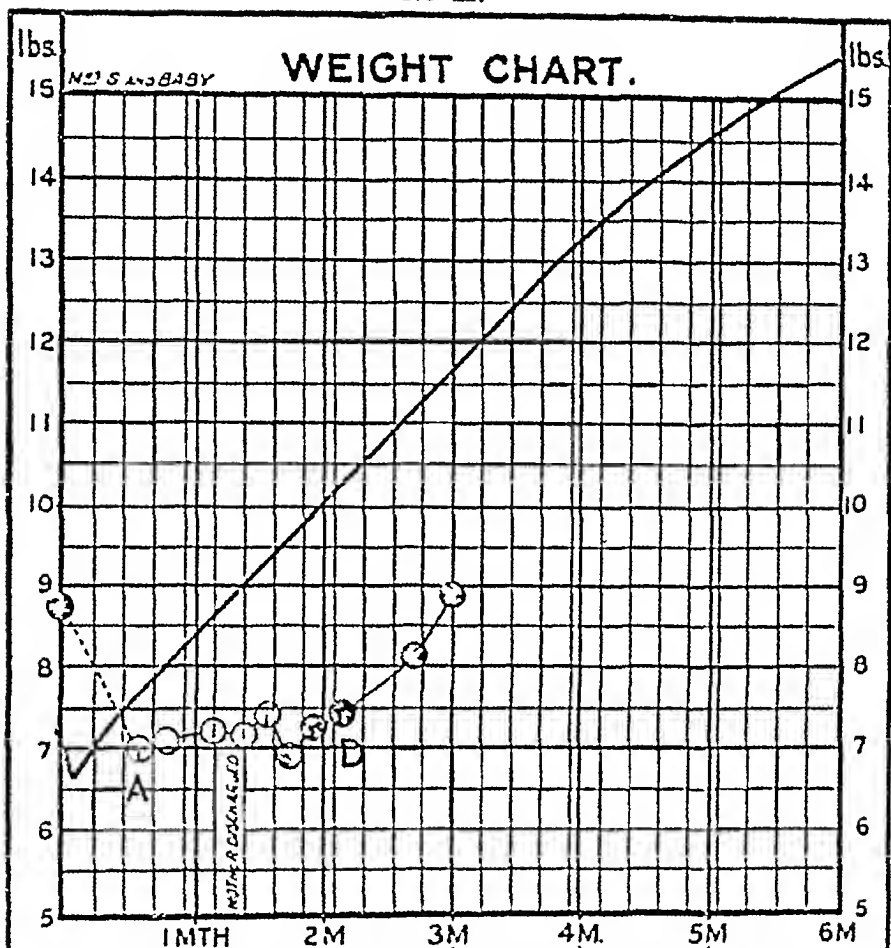
(5) Take at least $1\frac{1}{2}$ pints extra fluid in the 24 hours; the greater part of this should be water. It is a good plan to drink a glass of water each time baby is fed

(6) Stimulate the breasts by hot and cold sponging twice daily—have two bowls, one with hot and one with cold water, and a separate sponge or cloth in each, bathe each breast, first in the cold and then in the hot, moving quickly from one to the other, dry quickly with a rough towel, and rub the breasts from without towards the nipple, always supporting the breast with

* Intervals ordered to meet the case, usually 3 or 4-hourly

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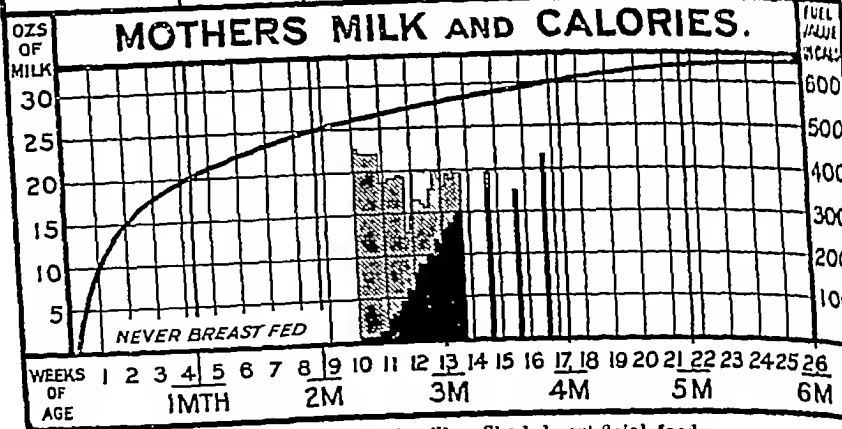
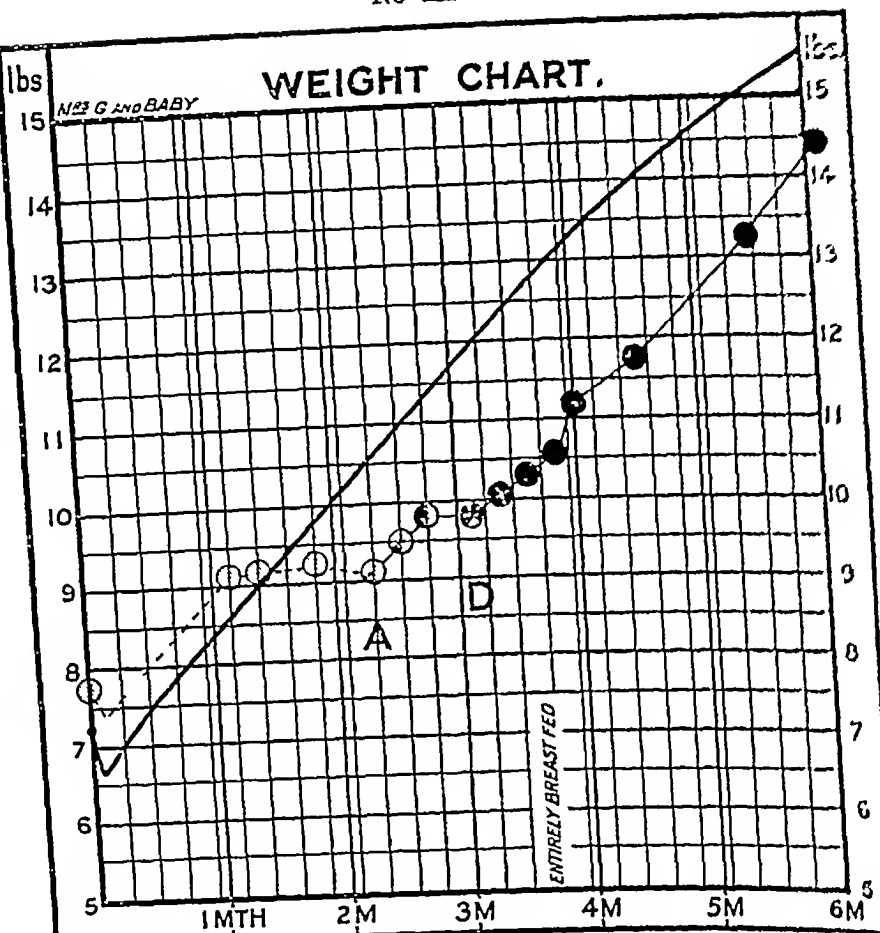
No II.



Black indicates breast-milk. Shaded, artificial food.

BREAST FEEDING CASES

No III



Black indicates breast-milk. Shaded, artificial food.

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suggested that starchy preparations vary in their rickets-producing qualities. Experimentally oat flour has been shown by Mellanby to be more rickets-producing than wheat flour, although the reason for this cannot easily be seen. Examining Table A it is apparent that in fact oatmeal contains more calcium than white flour and much more phosphorus.

TABLE A¹

The Calcium and Phosphorus Content of Various Cereals.

	Per cent Calcium	Per cent. Phosphorus	Ca	P
Oatmeal . . .	0.069	0.392	1	5.7
Rice . . .	0.009	0.096	1	10.7
White flour . .	0.020	0.092	1	1.6
Wholemeal flour	0.031	0.238	1	7.7
Barley . . .	0.020	0.181	1	9.0
Rye flour . . .	0.018	0.289	1	16.1
Wheat germ . .	0.071	1.050	1	14.8

Regarding the *food value*, the proportions of carbohydrate, fat and protein are shown in Table B.

TABLE B²

The Proportion of the Food Elements in Various Cereals

	Per cent Carbohydrate	Per cent. Protein	Per cent Fat
Oatmeal . . .	67.5	16.1	7.2
Rice . . .	79.0	8.0	0.3
Wholemeal flour	71.9	13.8	1.0
White flour . .	76.4	7.9	1.4
Barley . . .	77.8	8.5	1.1
Rye . . .	78.7	6.8	0.9

It will be seen that a considerable quantity of vegetable protein is present in addition to the carbohydrate content in many forms of starch.

Regarding their *iron content*, it is an interesting fact that oatmeal contains much more iron than white flour, and, according to the figures given by Stockman,³ it has almost the same iron content as beef. This is

STARCH IN INFANT FEEDING

most important when one considers the relatively minute quantity of iron present in both breast and cow's milk. Recently, Dr. Mackay¹ has once more pointed out the tendency for apparently normal healthy infants to show varying degrees of anæmia

STARCHY PATENT FOODS.

TABLE C⁵

Composition of Patent Foods

Allenbury's Malted Food, No 3 (P) 9 2, (F) 1 0, (C) 82 8 A mixture of wheat flour and malt When prepared according to directions, it still contains some unaltered starch Designed for children above the age of six months One tablespoonful (about 1 oz), a teaspoonful of sugar, and three tablespoonfuls of cold water, mix, and add $\frac{1}{2}$ pint of boiling milk and water (equal parts) Calorie value of 1 oz = 113

Arrowroot (P) 8 0, (F) Trace, (C) 82 5 Made from the starch of the root of a West Indian plant (*Maranta arundinacea*) Calorie value of 1 oz = 100

Benger's Food (P) 10 2, (F) 1 2, (C) 79 5 A mixture of wheat flour and pancreatic extract When prepared according to directions, most, but not all, of the starch is converted into soluble forms The protein is also partially digested as well as that of the milk used in mixing it One tablespoonful (about 1 oz) and four tablespoonfuls of cold milk, then add $\frac{1}{2}$ pint of boiling milk and water, set aside in a warm place for fifteen minutes, then bring to the boil Calorie value of 1 oz = 110

Chapman's Whole Wheat Flour (P) 9 4, (F) 2 0, (C) 79 3 A finely-ground wholemeal flour Not much superior in nutritive value to ordinary "household" flour Starch entirely unaltered Calorie value of 1 oz = 112

Cream of Rice (Groult's) (P) 6 9, (F) 0 3, (C) 80 0 This is a patent food containing a high proportion of starch Calorie value of 1 oz = 105

Cream of Wheat (P) 11 81, (F) 2 40, (C) 72 46 Made from the granulated endosperm, or kernel, of wheat Calorie value of 1 oz = 108

Glaxo Malted Food (P) 11 3, (F) 2 1, (C) 81 6 A partly malted food prepared from wheat and barley Calorie value of 1 oz = 117

Glax-Ovo (P) 18 3, (F) 13 3, (C) 62 2 A preparation consisting of milk solids, malt extract, flavoured with chocolate and containing added vitamin D Calorie value of 1 oz = 133,

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Mellin's Food (P) 10 3, (F) 0 16, (C) 79 5 A completely malted food All the carbohydrate is in a soluble form May be regarded as a desiccated malt extract Half a tablespoonful, $\frac{1}{2}$ pint of milk and $\frac{1}{2}$ pint of water for a child under the age of three months Calorie value of 1 oz = 108

Neave's Cereal Food (P) 13 04, (F) 0 97, (C) 80 84 A purely cereal preparation Calorie value of 1 oz = 115

Nestle's Milk Food (P) 14 5, (F) 6 15, (C) 77 2 A mixture of desiccated Swiss milk, baked wheat flour and cane sugar (27 per cent) Contains about 18 per cent of starch Calorie value of 1 oz = 126

Ovaltine (P) 14 2, (F) 8 01, (C) 67 9 A concentration of the nutritive constituents of malt, milk and eggs, flavoured, cocoa, and issued in the form of light, readily soluble gr P Contains neither starch fibre nor husks of grain Calorie value of 1 oz = 120

Ridge's Food. (P) 9 2, (F) 1 0, (C) 81 2 A baked containing only 3 per cent of soluble carbohydrates, the remainder being starch Recommended to be made with milk and Calorie value of 1 oz = 111

Robinson's Patent Barley (P) 5 1, (F) 0 9, (C) 82 0 pearl barley, poor in every element except starch and mineral Calorie value of 1 oz = 106

Robinson's Patent Groats (P) 11 3, (F) 1 6, (C) 83 2 Ground oats from which the husk has been removed Calorie value of 1 oz = 110

Ryvita Crispbread (P) 11 6, (F) 1 3, (C) 71 8 Made in Sweden from crushed whole rye grain Calorie value of 1 oz = 110

Savory & Moore's Food (P) 10 3, (F) 1 1, (C) 83 2 Compound of wheat flour with the addition of malt and diastase prepared according to the directions, most, but not all, of the starch is converted into soluble forms (chiefly dextrins) One or two tablespoonfuls (equals from 1 to 2 oz) to be mixed with two or three tablespoonfuls of cold milk or milk and water, and one pint of boiling milk or milk and water to be added Calorie value of 1 oz = 115

Scott's Oat Flour (P) 9 7, (F) 5 0, (C) 78 2 A fine oat flour Starch unaltered Calorie value of 1 oz = 118

Sister Laura's Food (P) 15 1, (F) 1 98, (C) 79 9 A food prepared from wheat starch, intended as an addition to undiluted milk Calorie value of 1 oz = 120

Soya Bean Flour (P) 11 0, (F) 20 0, (C) 11 0 Used to thicken milk mixtures or with water as a substitute for milk food with the addition of sugar Calorie value of 1 oz = 124

Vegum (Wander) (P) 9 6, (F) 2 9, (C) 77 2 A vegetable powder prepared from tomatoes, carrots and spinach, for addition to milk mixtures Contains a high proportion of essential mineral salts, including iron Calorie value of 1 oz = 102

INFANT FEEDING

Varieties of Starch in Patent Foods and their Relative Digestibility.—Looking through the list of starchy patent foods in Table C, it may be noted that some contain one form of starch only, i.e. only wheat or oat flour, some contain a variety, while many contain, in addition to starch, malt or starch¹ which has been dextrinized. In a number of such starchy preparations actual cooking is not recommended by the manufacturers, but merely adding them to boiling milk and wing the whole to stand. This will obviously

split all the starch granules open and allow mixture to take place freely. It is best, therefore, direct dealing with young infants actually to cook (1 oz.) starch preparation with either water or milk water, later. Such cooking is best done in a double Calorie

an for periods up to half an hour. Certain starch preparations may be added to warmed-up feeds and, Calorie of diastase which has been added, they

do not require further cooking, the starch granules being wheat direct^{ed} in this way. All forms of starch are not formally digestible. Potato starch, for instance, is milk digestible than, say, oat starch, but all should be set ally easily managed if properly cooked and split Calorⁿ.

Advantages of Starch in Making Thick Feeds—The fine^{va}ility of starch to absorb fluid and swell is common Calowledge. For instance, a heaped teaspoonful of Robinson's Patent Groats makes half a cupful of thick a^{va}uel. It takes two heaped teaspoonfuls of Groult's Cream of Rice (rice flour) to make a similar quantity. Certain pathological conditions in infancy benefit by thick, concentrated feeds. In rumination (mercyism)⁶, where the infant tends to spit and vomit small quantities from one feed to another, if the feed be thickened with some starchy preparation, such as Benger's or Savory & Moore's Food, it is retained much more efficiently, and the infant gains. In wasted infants a small con-

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centriated, easily digested feed is sometimes required, and well-cooked starch in any form added to either a dried milk or to fresh milk and water, hurries on the child's return to the normal. It is well known that in conditions such as congenital heart disease, underweight infants, once they commence mixed feeding, seem to gain weight better, and this is probably due to the concentration of the food, containing relatively a large number of calories. This may also be true in cases of eczema, when a starchy food may replace some of the milk in the diet.

Method of Introducing Starchy Foods.—In a perfectly normal infant, starch feeding should commence at the fifth or sixth month. It is well to begin with a feed, say at 10 a.m., containing a heaped teaspoonful of oat or wheat flour. The flour should be mixed to a paste with cold water and then, with additional water, cooked from half an hour to an hour in a double saucepan. This is then added to the milk and water feed or dried milk feed, or may be given semi-solid in a cup with a spoon. In this latter case it may be thinned out with a little of the milk feed, the remainder of the milk being given from the bottle or the breast afterwards. When an additional starchy feed is given it is well to give a different cereal from the one previously given. Undoubtedly a mixture of starchy foods is a great advantage. The second starchy feed is best given at 6 p.m. Starch is found in green and other vegetables, apart from potato, and in such a form is accompanied by a wealth of mineral salts. Bone broth made from potato, green and root vegetables, therefore, supplies starch and mineral salts liberally at the 2 p.m. feed. At 6 a.m. and 10 p.m. it is best to give milk, water and sugar only, without starch.

CONCLUSIONS

- (1) The addition of starch to an infant diet allows

INFANT FEEDING

carbohydrate digestion to take place more slowly and there is less tendency for fermentative diarrhoea to occur.

(2) Starch is a useful addition to sugar to metabolize the fat in an infant's diet.

(3) The presence of a colloidal solution of starch (cooked) retards curd formation, and therefore adds to the digestibility of milk.

(4) Calcium, phosphorus and iron are all supplied in appreciable quantities in starchy foods

(5) Apart from normal infants, thickened, concentrated starchy feeds are most useful in treating conditions such as rumination and gross malnutrition.

(6) In normal infants starch should be introduced as a routine by the fifth or sixth month, either by itself as porridge or pudding, or in the form of bone and vegetable broth.

(7) Green and other vegetables supply not only starch, but essential mineral salts and substances, and may be introduced as bone and vegetable broth, or as vegetable powder

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Some Difficulties of Infant Nutrition.

By E. A. BARTON, MRCS, LRCP

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Hospital*

IT is only comparatively recently that the science of infant dietetics has received the attention that it deserves and which was so long overdue. Hence there still lingers about the subject much of the empiricism of the past; and these empirical convictions are hard to combat inasmuch as the extraordinary adaptability of the infant economy will permit it to tolerate dietetic outrages with a certain impunity—and even thrive on them—giving in a few cases a false impression of success. This impression fades when a great number are submitted to the same regime, but by a process of trial and error an optimum has at last been nearly reached, any great divergence from which is likely to lead to definite failure of nutrition. I shall try to draw attention to some of the lesser difficulties, without any apology for the necessary disconnection between the various subjects.

The Sugar Factor in Infant Feeding—The sugar factor in the artificial feeding of infants is a matter of some conflict of opinion in the textbooks devoted to the dietetics of infancy. The American School are somewhat fearful of excess sugar in the feeds, claiming "sugar fever," whatever that is, and diarrhoea as a penalty for transgression. The Continental schools, on the contrary, are not afraid of giving large excess of sugar in appropriate cases, von Pirquet and Schiek of Vienna giving as high as 20 per cent. sugar feeds in premature and marasmic

infants.

The sugars used in our Welfares are usually lactose, cane sugar, and dextrin-maltose, pure maltose being rather too expensive for use in quantity and not often essential. In the case of a healthy infant lactose has very little advantage over cane sugar. Cane sugar is more quickly assimilated, is digested higher up in the alimentary canal, and is pleasanter to taste and thus more acceptable to the infant. In favour of lactose it may be said that as it is digested lower down the gut the growth of natural intestinal flora is encouraged. As any excess of dextrin-maltose tends to produce loose bowels, I do not think that this sugar should be used in excess. The toleration point of infants to sugars is about double that in adults, varying somewhat for different sugars, for the absorption limit of cane sugar and lactose is equally about 3 to 3.6 grams per kilo, whereas for grape sugar and maltose this figure is doubled. The calorie value of sugars is roughly about 15 calories per drachm.

Now as to the use of sugars. It is known that the use of sugar in excess for a short period will often tide a feeble infant over a dangerous period when other means have failed. The cases suitable for such feeds should be free from loose bowels and vomiting, and are those of profound marasmus in which feeds of adequate calorie requirements have failed to benefit, and in which the sugar factor is low, such as diluted milk without additions. Premature infants, as von Pirquet showed, do extremely well on plus sugar feeds, and this at a time when any serious failure of assimilation kills the weakling. It seems that infants under four pounds, whose mothers are unable to suckle them, are very tolerant of sugar and obtain their calories from the sugar when the fats and proteins are risky in anything

and dripping. As to irradiated milk, and the irradiation of the skin by ultra-violet rays to prevent or cure rickets, such devious and expensive methods of synthesizing the vitamin seem needlessly elaborate when such a cheap and potent substance is readily available in cod-liver oil, which, as recently pointed out very forcibly, also has the advantage of a considerable content of vitamin A.

Green Stools.—The green stools of a breast-fed infant are of far less consequence than in one artificially fed, and many infants gain weight and seem but little distressed though passing spinach-green stools, if entirely breast-fed. In artificially fed infants green motions are generally associated with looseness and the passage of much mucus, a condition not so amenable to treatment. The cause of green stools is not yet quite clear, though the colour is due to the oxidization of the bilirubin into biliverdin. It has been suggested that there is an oxidizing organism existent in the infant's intestine which does not flourish in that of the child much over a year, but it has not been found possible to isolate from a green stool any organism which can produce oxidation of a normal stool outside the body. As to the treatment, I find that eight out of ten breast-fed infants recover on three-drop doses of castor oil suspended in mucilage thrice daily. This favourable result, however, does not apply to bottle-fed infants, in whom green stools are often associated with deficient assimilation of fats; the diet therefore should be considered accordingly.

Citration of Milk.—With regard to the citration of milk the amount of citrate of soda needful fully to citrate London milk is not more than a third of a grain to the ounce. This no doubt is due to the heating of the milk before it is distributed, some of the calcium being thrown down as insoluble

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during that process I have conducted carefully a series of small experiments which prove that the usual two grams to the ounce is quite needlessly large in towns where the milk is pasteurized, and I could not get any curdling in bulk after addition of a third of a gram to the ounce of London milk—sometimes with even only half that amount. As a matter of practice I never give more than five grams of citrate in any bottle feed however large. This holds for milk after treatment by heat, for milk fresh from the cow requires a gram and a half to the ounce fully to citrate it.

Calorie Feeding—The feeding of infants according to calorie estimation applies only to healthy infants Heubner laid down the formula that an infant requires daily 100 calories per kilo, or 45 calories per pound. This estimation varies even in healthy infants to the extent of 15 per cent. plus or minus, but when an infant is under weight for its age the variation is much greater, sometimes as much as a 50 per cent. error. Cow's milk, human milk, reconstituted whole cream dried milk have each about 20 calories per ounce, while cane sugar contains about 15 calories per drachm. If, for instance, we take an infant of five months weighing, say, ten pounds we find that if we fed that infant according to the formula we should starve it if we fed it according to its age we should over-feed it. The best plan is to take the mean between a feed appropriate to its age and to its weight, and this generally is not far wrong. But this should have no connection with any calorie computation. Calculations which are liable to a 50 per cent. error are not of value.

Chronic Dyspepsia in Childhood.

By ROBERT HUTCHISON, M.D., F.R.C.P.

Physician to the London Hospital, and to the Hospital for Sick Children, Great Ormond Street

DYSPEPSIA in the child is a very different thing from what it is in the adult. In the first place the serious organic forms, such as those due to carcinoma and ulcer, are scarcely met with at all. Further, disorders of the liver and intestine play a much larger part in the production of "dyspepsia" in the child than they do in the adult, whilst the part played by the stomach is relatively less important. Again, whilst in the adult it may be said that other conditions—gall-stones for example—often simulate dyspepsia, in the child it is dyspepsia which simulates other diseases. Thus many children are suspected of tuberculosis or are labelled "neurasthenic" or "debilitated" when all the time the real fault is in the digestion.

It must be admitted that we are still very ignorant of the true nature of the functional disorders of digestion and assimilation which produce dyspepsia in the child and this makes a clear account of the subject difficult, but for purposes of description we may divide them into three groups: (1) gastric, (2) hepatic, (3) intestinal, although it must be remembered that any two of these, or even all of them together, may be met with in the same patient.

GASTRIC DYSPEPSIA.

There are two causes of this in children. (1) chronic catarrh (gastritis) and (2) functional disorders of secretion and motility.

(1) Chronic gastritis may arise out of an acute attack which has not cleared up or it may result

from chronic irritation of the mucous membrane by food which is chemically or mechanically unsuitable. Cane sugar in high concentration is a chemical irritant to the gastric mucous membrane and is a cause of gastritis in some children, fats, especially hot fats, are another common cause. Ill-chewed and bolted food acts mechanically. Chill also is a factor and some children seem to get a gastritis when exposed to cold just as others get bronchitis.

The symptoms of chronic gastritis are the same as in the adult and consist in poor appetite, nausea with occasional vomiting and some flatulence. The tongue is usually coated but otherwise there are no physical signs.

Treatment demands a plain simple diet, all coarse irritating foods being excluded, attention to the teeth and to chewing, protection from cold and the administration of bismuth, rhubarb and soda before meals with mercurials and laxatives, if necessary.

(2) Functional disorders of the stomach as a cause of dyspepsia in children are more obscure even than in the adult. Children, of course, are not able to give an accurate account of their sensations and cannot describe such symptoms as acidity, heartburn and fullness. Comparatively few investigations also have been made in children by the test-meal, either in health or disease, and such as have been reported show contradictory results.

Hence it may be said that of disorders of secretion as a cause of dyspepsia in childhood we know practically nothing. Even of disorders of motility we are very ignorant but in older children one meets not infrequently with the splashy stomach which probably indicates a lack of muscular tone. This is often only a part of a general atonic condition and demands the adoption of measures to improve the whole health and physique. The local condition is best treated

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DYSPEPSIA IN CHILDHOOD

are milk, cream and eggs, the "dairy products" in short, but such accessory articles of diet as chocolates and oranges are also "bilious" for many children. The attempt to fatten these predisposed children by giving them quantities of milk and cream is the main cause of their dyspepsia. The liver seems to become glutted with imperfectly metabolized material and the episodes of vomiting or fever clear it out and enable a fresh start to be made.

The slogan "drink more milk" has thus much to answer for, and the kindred cry of "eat more fruit," which has partly led to the present craze for giving children large quantities of orange juice, is also responsible for much hepatic dyspepsia, though it is difficult to explain how oranges produce this effect.

The treatment of hepatic dyspepsia is simple and obvious. It consists in cutting down the "liver foods" in the diet and giving hepatic stimulants of which a combination of rhubarb and grey powder, administered every night and for long periods if necessary, is the best. In most cases this treatment will also abolish the occurrence of the episodes, but cyclical vomiting, if it still occurs at times, will require treatment by alkalis and glucose in the usual way.

INTESTINAL DYSPEPSIA

The third variety of dyspepsia is the intestinal and, like the hepatic, it is very common. Intestinal dyspepsia occurs at a somewhat later age than hepatic, most of the children who suffer from it being six years old and upwards. It is, moreover, the form of dyspepsia which is most apt to be mistaken for other things, for the presenting symptoms are not usually abdominal. The practitioner may be consulted because the child is thin and wasting or because he is languid and peevish, and, as the mother says, "hes about all day." Often there is a cough

by a dry diet and a mixture of soda, nux vomica and gentian before meals

On the whole, it is probable that a purely gastric dyspepsia is not common in the child, unless in an acute form and that, when met with, a chronic gastritis is its most likely cause

HEPATIC DYSPEPSIA.

The term hepatic dyspepsia may be used for that variety of chronic indigestion in which a functional disorder of the liver appears to be the cause of the symptoms. Such cases are quite common and are probably getting commoner. They are met with in children from the age of three upwards. The child will usually be brought with a complaint of indigestion, is thin and does not gain weight and he is nervous and irritable by night. The bowels are constipated. There is no complaint of pain or other symptom. Two features aid in the diagnosis. One is the "fetid" breath and the other is that the child is times very pale in colour.

Such are the general features of the chronic picture is apt to be characterized by which may take the form of vomiting, kind, of recurring rises of temperature, fever"—or of headaches of the migrainous type may be on account of one of these rather than the other. The condition that the child is brought together, in dyspepsia seems to be due to the same cause as appears to be in many of the cases of inborn inefficiency.

There are two causes of Sir Andrew Clark's catarrh (gastritis) and secretion and motility.

(1) Chronic gastritis may be the exciting cause of the attack which has not cleared up.

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and recurs at much rarer intervals and is also often attended by vomiting. Umbilical colic is probably the result of a momentary spasm in the colon.

By henteric diarrhoea is meant a form of diarrhoea which comes on immediately after or even during a meal. It is probably, like umbilical colic—with which, indeed, it is often associated—the result of an exaggerated irritability of the colon.

The fainting attacks which constitute another of the “episodes” met with in the victims of chronic intestinal dyspepsia are no doubt of vasomotor origin and are an exaggerated outcome of the low blood pressure with its attendant pallor from which these children suffer.

As to the pathology of intestinal dyspepsia we know almost nothing, but the most plausible view is that it consists of a mucous catarrh affecting chiefly the colon and, to some extent, other mucous membranes as well. This results in a general over-production of the mucus, whence the name “mucous disease” given to it by the late Dr Eustace Smith. Some modern writers speak of these children as having the “exudative diathesis.” Whatever the exact pathology of the condition may be, there is general agreement that it is chiefly brought about by unsuitable diet and particularly by an excess of sugar and starch, although nervous over-strain, want of fresh air and exercise and the swallowing of infected mucus from an unhealthy throat may also play a part in its production.

In treating intestinal dyspepsia one should begin by regulating the child's life as a whole. It may be necessary to reduce the hours of school or to arrange for more time out of doors or more sleep. Change of air is of the greatest benefit, a bracing seaside or mountain resort suiting best. Chill must be avoided and to this end the wearing of an abdominal belt is a help. The feet and legs must also be kept warm,

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particularly in patients with colic or henteric diarrhoea. Attention should be given to the state of the teeth and if the tonsils are unhealthy they should be removed. Meals must be properly spaced and taken leisurely with no rushing off to school or play immediately afterwards and the habit of thorough chewing must be insisted upon.

In the dietetic treatment the essential is to cut down the starchy and sugary foods. No sweets and but little sugar should be allowed, potatoes should be restricted and crisp toast and rusks substituted for bread. Whole meal and brown breads are specially harmful in such cases. Raw fruits and raw vegetables must also be forbidden, as well as such things as raisins and currants which pass undigested through the bowel. Green vegetables must be well-cooked, and, if necessary, sieved. Eating between meals must be avoided. All these points should be impressed upon the mother in detail.

The most useful drugs are alkalis and bitters before meals and regular laxatives, of which rhubarb is the best. Iron should be avoided until the tongue is clean and the bowels are regular, after which it may be useful. "Oil and malt" should be kept for the stage of convalescence.

The "episodes" may call for special treatment. Umbilical colic usually disappears when the diet and bowels are regulated but, if it persists, the best remedy is a drop or two of tincture of opium before meals, and the same remedy always controls henteric diarrhoea. For the "faints" a strychnine tonic is all that is required in addition to the treatment of the underlying dyspepsia.

If, as not infrequently happens, the hepatic and intestinal forms of dyspepsia are present simultaneously, the dietetic and other treatment must be combined to meet both conditions.

Congenital Anorexia.

By G. F. STILL, M.D., LL.D., F.R.C.P.

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AMONGST the common troubles of infancy and early childhood is lack of appetite, anorexia. The term appetite is used here as meaning the desire to take food. Distinctions have been drawn between hunger and appetite: the one is described as distressing, the other as pleasurable, it seems probable that this is only a matter of degree. To describe appetite as "hunger or mild hunger plus taste-memory processes" (Hoelzel)¹ is not to differentiate it from hunger, but only to state the undoubted fact that hunger may be directed towards this or that food by taste-memory. When we speak of a person having a good appetite, we mean that he is eager for food, in other words, that he is hungry. If the term "appetite" is applicable at all to the desire for food shown by the newly-born infant, it is clear that it refers to some impulse which cannot be related to any taste-memory, for he has no past on which to base it.

It is the absence or feebleness of desire for food, lack of hunger or lack of appetite, call it as you will, in some newly-born infants which I want to mention here. We are accustomed to regard failure of appetite as a symptom of some disorder or disease, that is, as a secondary phenomenon, and in the large majority of cases this is, no doubt, the correct view to take; but is it so in all cases? I think not. Amongst a large number of children brought for this particular trouble, there are a few whose history shows that the lack of desire for food dates back to the earliest days of life.

I had for a long time supposed that the mother's

statement that the child had "never" taken food willingly was only an instance of the exaggeration which makes the maternal description of a child's ailments so often unreliable. In a few cases, however, the account was so circumstantial that I began to inquire into this point more carefully, and have done so for some years; and as a result of my inquiries, am inclined to believe that in certain cases an infant is born without the normal recurring desire for food, which we call appetite. The deficiency varies in degree; perhaps it is never absolute, but in some cases it comes very near to being absolute.

I could quote several cases from my notes, but the history is so similar in all that a few will serve. I select only cases seen within the first two years of life, because a mother's memory of her child's behaviour in the first week of life becomes less reliable as the child grows older; but cases might be quoted of much older children in whom the lack of desire for food seems to date from immediately after birth, and has persisted in lessening degree for several years. The following cases seen within the first two years of life are typical in their history.—

Boy, aged 22½ months, brought for lack of appetite. He was never breast-fed. From the time when feeding began he disliked food, would cry when coaxed to take it, and would refuse to suck. The difficulty has persisted ever since food is still administered with difficulty. He is a bright, intelligent child, a bad sleeper, and his weight is only 21½ lbs., that is about 6 lbs. below the normal weight.

Girl, aged 15½ months, brought for convulsions. Showed no interest in food from the time feeding was begun, the breast she refused altogether, so bottle feeding was tried, but each feed had to be forced upon her. This lack of desire for food has persisted, and though she takes a mixed diet now, it is with reluctance, except butter, which she likes. She is quite intelligent, is a very light sleeper and has had occasional convulsions since eight months old.

Girl, aged two years, brought because she "never wants food." By distracting her attention, the mother can sometimes get her to take food, but often it has to be given by compulsion—it is forced down. She cries when she sees food coming, and tries to vomit the food when given. The aversion to food was noticed directly after

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birth She is a happy child except when meals have to be taken, she seems quite healthy, but her weight is only 24½ lbs

These cases differ in no way from the common cases of acquired anorexia, except in the fact that the anorexia dates from immediately after birth. It is clear that in them the ordinary causal factors which account for anorexia and aversion to food in infants and young children, namely, dentition and digestive disorders, cannot be operative: some congenital abnormality of function has to be assumed. One might suppose that the nature of the abnormality would at once be suggested by a consideration of the processes concerned in the production of normal appetite. But what are these processes? Physiologists are not agreed even as to the parts concerned in the production of appetite or hunger. Clearly it is, in part at least, a sensory phenomenon, and, as such, referable to the brain, perhaps even to a particular part, a hunger centre; some have thought that it is induced by some state of the tissues in general or of the blood in particular, others that it is due to stimulation of sensory nerves in the stomach-wall, the milder degree, appetite, being due to stimulation of the nerves in the gastric mucosa, the more advanced degree, hunger, to stimulation of nerves in the submucosa or muscular layers.

A combination of these views seems to be the position reached by Kuntz in his recent work on "The autonomic nervous system" Depletion of the nutrient substances in the circulating blood he regards as an important factor, and he quotes Thoma's view that this excites, in some part of the brain not yet localized, "efferent impulses which bring about reactions, which in turn initiate afferent impulses resulting in the sensation of hunger." The hypothetical "hunger-centre" is, in fact, stimulated by the state of the blood when a certain degree of depletion of nutrient

material has been reached, just as the respiratory centre is by blood depleted of oxygen.

Applying this view to the normal behaviour of the foetus *in utero* and the newly-born infant, one may suppose that the foetus *in utero* is normally in a state of continuous physiological anorexia, which is due to lack of excitability in the brain-cells, and is further assured by a constant supply of maternal blood more or less rich in nutrient material. At birth the brain cells become responsive to stimuli, the supply of blood by the cord is cut off, and after a short time the available nutritive material in the blood is used up, and the infant experiences appetite or hunger for the first time. It shows desire for food and sucks eagerly. In this way the starting soon after birth of that periodically recurring impulse to take food, which we call appetite or hunger, may be explained.

An explanation of the failure *ab initio* of the normal desire for food is much more difficult to find or even to conjecture. There is a pathological condition in which there seems to be anorexia from birth; sometimes in extreme degrees of idiocy the newly-born infant shows no sign of desire for food, and, indeed, if the mother or nurse waited for him to show signs of hunger he would die of starvation. In such cases one may suppose that the apparent absence of the sensation of appetite or hunger is due to failure of the brain to respond as it should to the stimulus of the blood when depleted of nutriment, the failure in such cases is the less surprising as it is part of a more general failure of normal reaction of the brain to stimuli. In a less degree it is noticeable that infants who are much premature often show at first little or no desire for food, and here again, as one may judge from the sluggish response to other stimuli in such infants, the feebleness of the impulse to take food may be due to low excitability of the brain cells in the incompletely developed

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infant.

In the full-time mentally-sound infant, however, there is no reason to assume any such general lack of response to stimuli, and if the anorexia is due to any lack of brain response, it must be a failure in particular cells or in a particular centre, if such there be. As a rough analogy, one might point to the curious cases of long-delayed commencement of speech—a delay which I have known to extend up to the seventh year—in children who are otherwise normal. These have been described as due to absence of the “*sprechlust*.” absence of the desire to speak. There are, of course, wide differences between the processes involved in speech and those concerned in appetite or hunger, but the analogy is not altogether fanciful—in both cases there is the failure of a desire which seems to be innate, though latent at birth, in the normal individual, and which should appear at a particular time—the one within a few hours, the other within a few months after birth.

As in the case of lack of desire to speak, the child with congenital anorexia, if he is otherwise normal, acquires the lacking desire to a greater or less degree sooner or later; but even after several years the desire for food in a child who started life with this anorexia is apt to be lacking in normal keenness—he has no interest in his food, and takes it more as a matter of routine and necessity than as a matter of pleasure—he has to be educated into taking his meals.

Reference.

- ¹ Hoelzel *Am Journ Physiol*, LXXII, 665

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is not always easy to find, and in three cases it was most difficult. In one, in which I failed to find it, others succeeded. Again, it may not always be felt on the first examination, but it has been invariably found within 48 hours of admission.

The details of the method of palpation are as follows. The infant lying on its back is given a feed of milk, or sweetened water, and the examiner sitting to the left of the child palpates the abdomen with the left hand, which must be thoroughly warm. The liver is first defined and then the stomach traced to the pyloric end, and the pylorus gently searched for with the middle finger. Such details may appear superfluous and their description uncalled for, but I am convinced that palpation of the tumour, which is by no means always easy, is of the utmost importance, for upon its accuracy depends a vital diagnosis. A valuable feature is its consistence, frequently it feels like a knot in a cord and for this reason it is possible to detect it even when under the liver as it moves down on inspiration. It may, however, be more linear in shape and then resemble a cord rather than a knot, and may sometimes seem so large as to raise a doubt whether it can belong to the pylorus. The first attempt by palpation may be successful, but more often patience is required and the tumour is felt only after the infant has taken some food. Again in other cases it may appear and disappear with such rapidity that before one examiner can demonstrate its presence to another it may be gone. When it lies over the right kidney the great size of the stomach may deceive and the tumour be missed.

There is a puzzling condition in which the pylorus seems to be palpable but does not give the impression of a tumour. Everyone who meets with these cases wonders whether actually the pylorus that is

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felt, and then whether it is not possible, with sufficient care, to feel it in all infants, my own impression is that the latter is not possible. Of the occurrence of these cases I have no doubt and am the more sure, because on one occasion, previous to the date of this series, I urged operation and the pylorus showed no thickening and I have come near the same error more than once. These children are usually older than those with pyloric stenosis, and the symptoms are vomiting and discomfort with flatulence; peristalsis may be seen and there may be diarrhoea rather than constipation. These cases are difficult to treat and recover slowly, but yield to medical measures. Though I have thought it probable, and have followed them closely, I have never found that any of them developed definite pyloric stenosis. Not one of the 100 cases in this series was of that nature as was proven at the operation by the finding of the tumour.

The third point is the result of operation. There were 80 recoveries and 20 deaths. The condition of the child at the time of operation was roughly classified into good, fair, bad, and very bad. The figures were 35 good, 39 fair, 26 bad and very bad. As examples of very bad conditions these three cases may be quoted as having made perfect recoveries. (1) An infant 24 days old, jaundiced, bleeding from the bowel and apparently moribund. (2) An infant 36 days old, operated upon while in convulsions. (3) An infant 29 days old with fulminating symptoms, a tumour difficult to feel high up under the liver and at operation difficult to mobilize.

The natural criticism may be raised that persistence in one definite line of treatment may have meant the sacrifice of lives. But it must not be supposed that in the very bad and collapsed cases no breathing

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better, but it is the good nurse that uses the "diet" scale with judgment who is the best assistant in dealing with the flatulence, when the child is artificially fed.

In addition to the three chief points, the statistics of this series illustrate various interesting points and support statements of other writers. The predominance of the male sex was striking, eighty-four were males and sixteen females. Fifty-three per cent. were first-born children, but one was the twelfth. In nineteen per cent. the vomiting commenced in the first week, in twenty-three per cent. in the second, and in twenty-two per cent. in the third. Forty-five per cent. were entirely breast-fed, and eighty-eight out of ninety-seven were breast-fed at first. In three of the series no record was available. From these numbers artificial feeding can certainly be excluded as a primary cause of pyloric stenosis. Fifty-one per cent. of the operations were done in the 5th, 6th and 7th weeks of life, but two, both successful, in the first fortnight. Visible peristalsis was recorded in eighty-four per cent. Constipation was the rule, and diarrhoea only occurred in two cases sufficient that is to warn us that pyloric stenosis may be present with this symptom. For the analysis of this series of cases I am greatly indebted to Dr. Alan Moncrieh, In-patient Medical Registrar to the Hospital for Sick Children, Great Ormond Street.

It may be of some interest to comment upon the impressions given by some ten years' study of the tumour in pyloric stenosis. In many cases there appear to be repeated contractions and relaxations of the sphincter as soon as a feed, however small, is given to the child. It is no exaggeration to state that in some instances this tumour may be felt and lost as often as six times while the infant is struggling

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with a small feed of milk or sweetened water. If this happens on the occasion of one small feed given, let us suppose, to a child four weeks old, it raises the natural speculation as to how often the pylorus may have contracted and relaxed irregularly during those weeks in which the child had been taking at least six full feeds in the twenty-four hours. In turn this raises the question as to what effect these repeated efforts would have upon the musculature of the pylorus.

The researches of Cannon and others have shown that there are two distinct elements in the production of the motor activity of the stomach. The first of these is a local reflex set up by the presence of the food in the stomach which is concerned with mixing of the gastric contents. The second is more complex and depends upon the integrity of the central reflex arc. It would appear that the vagus fibres are motor to the stomach proper and inhibitory to the sphincter, while the sympathetic is responsible for the tonic contraction of the pylorus. In the normal mechanism a wave of peristalsis of vagal origin thus produces an automatic relaxation of the pylorus through the central co-ordination of these systems. It is possible to conceive that through some error of development in this reflex arc some greater or lesser degree of inco-ordination may arise resulting in a contraction of the pylorus against an oncoming wave of gastric peristalsis. Such a theory as this will account for the two most striking features of the condition, the projectile vomiting which results from the gastric peristalsis throwing the food against a tightly closed pylorus, while the hypertrophy of the sphincter is the result of its mistimed efforts in obstructing the outflow of the gastric contents.

The operation as we know consists in cutting

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through the tumour down to the mucosa, dividing the peritoneal coat and the muscular fibres and submucosa. In the favourable cases the vomiting ceases at once or within a day or so and recovery ensues. In no instance in this series was an infant readmitted for a recurrence of pyloric stenosis, and the rule was for the child to become fat, even fatter than the normal child, during the first six months after recovery. Photographs and grateful letters are often sent by admiring mothers to the most deserving of all recipients, the skilled sister of the ward, who had supervised the early anxious days after the operation. It is very clear then that the disturbed co-ordination between the contraction of the stomach and the pylorus had after the operation passed away and though the hypertrophy may remain long after, this is a matter of no importance for the child thrives and loses all symptoms of over-action of the thickened muscle.

It would seem possible that, though the nervous instability may be congenital, the hypertrophy may not always be congenital but be a secondary result due to the abnormal muscular effort to which the pylorus is subjected. Thus, as others have suggested, there are points in common between hypertrophic stenosis, achalasia of the cardia and Hirschsprung's disease.

The details of such operations are not in my province, but to my surgical colleagues, and in particular to Mr. T. Higgins and Mr. Barrington-Ward, my indebtedness is great, for upon them rested the responsibility of operations often undertaken under circumstances of great urgency. The skill of the anaesthetists and nurses are also essential factors in obtaining success.

It is interesting to note that there is a definite group in which symptoms may be absent for weeks after

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birth and then urgent and incessant vomiting commences. From the fever that is present in some of these cases it would seem probable that gastritis has supervened. In others it suggests that folds of mucous membrane have been forced into the pyloric opening and caused obstruction. Whatever the explanation such cases may be promptly relieved by operation although they are among the most anxious types.

ŒSOPHAGEAL OBSTRUCTION

Among the various conditions of œsophageal obstruction met with in young children there are some which recall many of the features of hypertrophic stenosis of the pylorus. This is particularly the case with a group described by W. Sheldon and A. G. Ogilvie.² In recent years I have had two of these unusual cases under my observation, both of which were mentioned in the valuable paper alluded to above.

The first was a girl of eight years, who from eleven months had never been able to take solid food without vomiting. The second was a boy of 3½ years born prematurely at the age of eight months. In this case there were periodical attacks of vomiting and the child, who had lived almost entirely on liquid food, eventually died of broncho-pneumonia. At the necropsy, the œsophagus was found to be dilated and hypertrophied for about one inch below the cricoid to the diaphragm where there was a fibrous stricture. For this reason possibly this case should be separated from the group described by Sheldon and Ogilvie in which the obstruction was localized at the level of the seventh thoracic vertebra.

Symptomatology—The symptoms of this disorder commence in the first twelve months of life and the outstanding one, which may date from birth, is vomiting. This is usually effortless and may occur during a feed or immediately after a meal and is likely to come into greater prominence when solid food is added to the diet. The vomit consists of unaltered food, saliva and mucus. Another feature

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Hence we have two distinct classes of case :—(1) Those associated with excessive overgrowth and spasm; (2) Those associated with lesser degrees of overgrowth and spasm.

The condition is practically confined to first-born boy babies who at birth are exquisite specimens of babyhood. Out of over a hundred cases it has occurred in six female babies only (about 5 per cent.) and in all those the symptoms appeared later and were of a much milder type.

Symptoms appear from the 10th to the 17th day after birth and differ somewhat according to the class of case. Those associated with class (1) consist in almost immediate projectile vomiting of a feed ravenously taken, complete constipation and rapid wasting. Visible gastric peristalsis can always be observed and usually a pyloric tumour can be felt.

In class (2) the vomiting though projectile is not so persistent, the wasting is more gradual and the baby passes stools containing, as a rule, undigested food with some mucus. Visible gastric peristalsis is nearly always observed. It is this class of case that is apt to mislead the practitioner, and in the belief that the breast milk is at fault, the baby has often been weaned. A patent food is substituted and all goes well for 48 hours when vomiting commences anew. Another food is tried which may agree for a day or two and, in turn, a host of others. The baby gradually wastes, and if suitable treatment is not forthcoming acidosis of a grave type supervenes and death follows. From my series of over 100 cases, no less than fifteen were sent into hospital to the medical wards diagnosed "marasmus."

Treatment of the two types differ. That for Class (1) is strictly surgical if the child's life is to be saved. It consists in delivering the pylorus through an incision 1½ inches long and dividing its structures

ABDOMINAL CRISES

through their length down to the navel (Rammstedt's operation). This procedure can be carried out in 5 minutes either under local or general anaesthesia, and little disturbance is occasioned by its performance.

With regard to Class (2), it is justifiably advisable to administer goat's lactogen or even three times daily, followed by "a feed of mother's milk" and the addition of small doses of belladonna has given excellent results in nearly 50 per cent. of this class of case. The weight of the baby must be watched and if gaining, this treatment should be persevered with. If, on the contrary, vomiting continues and the weight is decreasing somewhat, then operation must not be delayed. The outlook is good, sufficient and otherwise if the patient's weight has not fallen below 5 lbs; if below this figure, the outlook is worse of which makes the outlook extremely grave.

Pyrexia seems to be part only of a general state of irritability which affects the whole alimentary tract. Post-operative treatment is easier with difficulties "if the baby has been weaned." The substitute foods are taken ravenously and are hurried along the intestinal tract. Diarrhoea ensues and a large proportion of the feed is passed undigested, leaving curdles. Belladonna and bismuth may cause some amelioration but they do not right matters. Sometimes a parent food is found upon which a particular baby thrives, but this is a rare event.

The only food which in my experience of many years with these cases gives the immediate result after operation is the mother's milk. If this is impossible, then the milk of a wet nurse. Failing this, goat's milk is the next best substitute. If this cannot be obtained, then when concentrated

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Pylorospasm seems to be part only of a general state of irritability which affects the whole alimentary tract. Post-operative treatment is beset with difficulties "if the baby has been weaned" The substitute foods are taken ravenously and are hurried along the intestinal tract Diarrhœa ensues and a large proportion of the feed is passed undigested. Wasting continues Belladonna and bismuth may cause some amelioration but they do not right matters. Sometimes a patent food is found upon which a particular baby thrives, but this is a rare event

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junction of the ileal and pelvic colons, the very points where the sympathetics and parasympathetics overlap.

ACUTE APPENDICITIS.

This may occur at almost any age. My youngest patient was a male baby one month old. In earlier years males are more prone to the disease than females. The favourite age is from five years onwards, and it seems that any diet which provokes peristalsis to an abnormal degree such as ice cream, unripe fruit, or indiscretion in the form of aperients can precipitate an attack. This is not to be wondered at, as so many appendices contain fecal concretions, and a violent attack of peristalsis in this organ, which is but part of a general peristalsis, may well cause impaction of the concretion with perforation.

A bilious attack, associated with severe pain referred to the umbilicus and accompanied by vomiting is the invariable complex of early acute appendicitis in a young child of five years and upwards. *On no account should a child with such symptoms be given an aperient.* Put the child to bed with a small dose of Nепenthe and watch carefully for localization of the trouble. An enema may be given, but never an aperient. It must be remembered that a child has but a short omentum and very slender means of localizing an inflamed appendix, hence treatment of a very conservative kind early in the case will make all the difference between success and failure. Should diarrhoea accompany these symptoms, it is almost certain that the inflamed appendix is pelvic in position and can usually be felt per rectum.

A Note of Warning—The temperature in a case of acute appendicitis rarely reaches beyond 101° to 102° F. The pulse-rate varies from 120. "The pain may pass and the child feels better." With this change the tongue remains dirty and the breath

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has a peculiarly offensive odour with a suspicion of acidosis. The eyes are bright and the abdominal pain and rigidity have gone. The pulse rate remains high. This is the time above all others to act for it means gangrene and perforation and the outlook is grave. The patient is in a condition of super-intoxication.

Acute appendicitis must not be confounded with right-sided pneumonia which latter often mimics it very cleverly. The temperature is higher, 103° , the respirations are increased and the pulse is full and bounding. Persistent vomiting and the history of a bilious attack are not forthcoming, and physical signs in the chest will make the diagnosis clear

Treatment of acute appendicitis is surgical, but it entirely depends upon the practitioner how early this treatment is available. Watch carefully for 24 hours and no longer a little patient who is seized with a bilious attack accompanied by abdominal pain and vomiting

ACUTE PNEUMOCOCCAL PERITONITIS.

This is perhaps the most dramatic and serious of all children's ailments; dramatic in its onset and dramatic in its finish. Confined almost entirely to female children, the common age incidence is from the 5th to the 8th year and coincides with the time that the vaginal secretion changes its reaction. The portal of entry of the infection is almost certainly the vagina and a pneumococcal vulvitis in female babies and young children is by no means uncommon if looked for. It is characterized by a sticky, moist inflammation of the labia which tend to adhere and it is resistant to treatment. The onset of the condition is sudden and is characterized by the extreme toxicity and collapse which accompany it. One typical

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Symptoms of indigestion associated with distension and colicky pains and periods of obstinate constipation almost amounting to obstruction occurring in a female child should arouse the suspicion of a threatened obstruction. An X-ray will always show the presence of calcified glands.

When obstruction becomes absolute there is severe abdominal pain with persistent vomiting which may smell faecal. The patients are very ill and present those symptoms of superintoxication which are dreaded by the surgeon, for they mean gangrenous gut. The pulse is rapid and thready and the patient is often cold and clammy. Operative mortality is high, in my cases 55 per cent, and in all of them resection of gangrenous small bowel was necessary. In passing, it may be remarked that the presence of calcified glands in the root of the mesentery does influence peristalsis by implication of the bowel nerve supply either by direct pressure or as the result of periadenitis. This is supported by operative findings —

A boy aged 13 years had eaten 1 lb. of raw carrots and was admitted to hospital with intestinal obstruction. Operation revealed the bolus of carrots about 3 feet along the small intestine and in the mesentery opposite was a large mass of calcified tuberculous glands. I have noted a similar occurrence in three cases in which I removed a so called impacted gall stone from the small bowel.

Acute obstruction in the small bowel in many instances must be regarded as an aftermath of so-called *tubercles mesenterici*.

There is much more one would have liked to say on this subject, but these few hints, which may be known to many but may be helpful to some practitioners, are gleaned from everyday experience over many years in Children's Hospitals in London, Bradford and the Continent, and such correlation, though perhaps scrappy, is often of help.

The Dysentery Bacillus as a Common Factor in Colitis in Children.

BY W G WYLLIE, M D, M R C P

Physician to Out-patients, Hospital for Sick Children, Great Ormond Street, Assistant Physician, Children's Department, Westminster Hospital

THE unexpected recovery of a dysentery bacillus from one or two children with colitis of a mild type suggested that the bacteriological investigation of a greater number of such cases might prove to be interesting. The material for this communication has been collected from personal cases over a ten months' period in the Out-patient Department of the Hospital for Sick Children, Great Ormond Street. Eighteen children were selected for bacteriological and serological examination. All were attending hospital for constant or intermittent looseness of the bowels with an obvious excess of mucus in the stools. In ten, evidence of dysenteric infection was obtained. Our principal aim, therefore, will be an attempt to demonstrate the frequency of a specific cause—the dysentery bacillus—in children presenting the symptoms of colonic catarrh.

Dysentery, we read in an authoritative work,¹ “in the fullest sense of the word is a ubiquitous disease, being met with in every inhabited region of the globe, from the equator to the arctic circle.” Further, it is stated that “in some European epidemics, nearly half the attacks and rather more than half the deaths have been among children.” Yet even to the present day the widespread prevalence of dysenteric infection

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Dysentery	Non specific
Tenesmus had been noted in three instances	No history of tenesmus was obtained
Vomiting did not occur	Attacks of vomiting suggesting periodic "bilious attacks" had occurred in two cases
A possible source of infection from a relative, usually the father after foreign military service, was present in four instances, but the suspects gave no history of enteritis	The fathers of at least four of these children had had foreign service, but gave no history of dysentery

We are now better able to stress such points of differentiation as may be of use clinically. Although the contrast between the two groups appears fairly clear on paper, in actual practice the distinction clinically was not so simple, as all these cases were first seen weeks or months after the onset of symptoms, and none of the "specifics" presented a picture comparable to that ordinarily seen in small epidemics of dysentery among children. We would also repeat that the occasional presence of streaks or small clots of blood in the general type of case with which we are dealing does not specially indicate a specific cause.

The points from the history which would favour the likelihood of a dysentery infection are an onset more or less sudden, a tendency for the diarrhoea to persist with intermittent augmentation of the flux, and tenesmus. At times of exacerbation, several of the stools may consist almost entirely of mucus. The colour of the motions is usually yellow, greenish, dark, and seldom grey or pale. A frequency of over four stools a day subsequent to the early stage is in favour of a dysentery infection. Fraser, Kinloch, and Smith² mention the

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TABLE I
DYSENTERIC POSITIVES

No	Sex	Age	Wt. in lbs	Duration of Symptoms	No of Stools	Mucous	Blood	Culture Places	Serum Agglutination
1 GF	♀	8	30½ (52 0*)	5½ years	0-8	+	0	0	Flex Z 1 in 250 Flex V 1 in 50
2 CW	♀	5½	48 (41 8)	A few weeks	4-8	+	+	Sonne	Sonne, 1 in 250 Flex V 1 in 250
3 ER.	♂	4½	30 (17)	1½	0-12	+	+	Sonne	Sonne, 1 in 125
4 JQ	♂	7	51 (40 5)	1 year	1-8	+	0	? Sonne	Sonne, 1 in 25 Flex, 1 in 25
5 L MoF	♂	5½	40½ (41)	1½ years	1-7	-	+	Sonne	Sonne, 1 in 125 Flex, Y 1 in 125
6 R MoF	♂	1	21½ (20 5)	1½	1-6	+	0	0	Sonne, 1 in 250
7 EJ	♀	4½	23½ (31)	1½	-1	+	0	0	Sonne, 1 in 250 Flex { V 1 in 125 Y 1 in 50
8 RC	♀	1½	20 (21)	1½	-4	+	0	0	Sonne, 1 in 50 Flex, V 1 in 50
9 BP	♀	5½	32 (41)	2½ years	0-8	+	+	0	Sonne, 1 in 250 Flex, V 1 in 125
10 DS	♀	7½	40 (48)	?	2-3	+	+	0	Sonne, 1 in 250 Flex, V 1 in 125

* The figures in brackets represent average standard weights for age.

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Poynton and R. R. Armstrong¹ mentions finding a dysentery organism at autopsy in the gut of a boy of nine years, who had had recurrent attacks of diarrhoea from the first year of life, and who, from the description, presented many of the features of coeliac disease. In two further cases of great severity, which Dr. Frew has kindly allowed me to mention, the serum agglutinations were both positive to a Sonne dysentery bacillus, 1 in 250.

In one of these, a boy 3 years old, the symptoms commenced at the age of two months, and non-fermenters were obtained in cultures of the faeces.

The second case, a boy of two years, first became ill at twelve months, the faecal cultures on two occasions were negative.

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the early weeks of convalescence from infection, or possibly not until months afterwards. One form consists of articular pains, especially on movement, without swelling. knees, ankles, hands, or other joints may be affected. In other cases, mono- or polyarthritis with swelling and pain occurs affecting such joints as the knee, ankle, shoulder, elbow or wrist. Rose⁵ holds the view that the most severe post-dysenteric complications are met with following the mild and abortive types of infection. Referring to the literature, he could find mention of only two instances of carditis associated with post-dysenteric arthropathy. Richards⁶ maintains that arthritis is seldom a complication of the Sonne type of infection, which may account for the rarity of post-dysenteric arthropathies in this country, where the Sonne form of infection is the most prevalent. The later the joint affections occur from the onset of the diarrhoea, the less likelihood is there of recovering the dysentery bacillus in the stool. Greppi⁷ mentions three cases of post-dysenteric arthritis in young children, all negative to faecal culture, but with positive serum agglutinations, as in our own case.

DIAGNOSIS.

The grounds on which a diagnosis of dysenteric infection were made will next be discussed.

(1) *The Dysentery Bacillus*.—In the ten "specific" cases, a dysentery bacillus was recovered from the stools of three only, a Sonne strain in each instance. Two of these cases were of recent onset. It is well known that recovery of the dysentery organism is most likely to be successful at the onset of the diarrhoea or during exacerbations when mucus is specially plentiful. Many of the stools of these out-patients were unsuitable for cultural purposes owing to the chronicity of the illness and paucity of mucus at the time of examination.

It is beyond the scope of this paper to enter into a

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A state greatly modified but similar to that seen in fatal cases may be supposed, and the main features observed among children, as have recently been recorded in the literature, are congestion of the colon and lower half of the ileum with acute inflammation of associated mesenteric glands. Ulceration, it may be noted, is rarely seen.

In our own cases, therefore, we may postulate a slight degree of congestion and mesenteric adenitis at the onset of the diarrhoea, when sudden, or during subsequent exacerbations. At other times, the excessive mucous output alone might account for such symptoms of mild indisposition as occurred. Toxic absorption in the majority was no more in evidence than in the cases of mucous disease.

Treatment.—The chief aim is to provide a diet favourable to bringing about an alteration in the intestinal flora. For this purpose certain carbohydrates are indicated by reason of the properties they are stated to possess in promoting the growth of such organisms as the *Bacillus acidophilus* and *Bacillus bifidus*. These bacteria tend to produce an acid reaction of the intestinal contents, which is unfavourable to the growth of the dysentery organisms.

Lacto-dextrin, two to four heaped teaspoons three to four times a day in milk or water, we think is definitely of value, from our experience in the treatment of these cases. Lactic acid bacillus tablets (Martindale's 'Tulaetine Tablets'), freshly prepared, are also useful, but many of the dried preparations of this nature are quite inert. Milk which has been soured with lactic acid organisms (for example, Bulgo-lac, Huddley's) is quite palatable, easily obtained, and should be given in a quantity of a pint a day. Buttermilk, which is acid—p H. 4.5—is stated to have been employed with benefit. Gottche¹ advocates the use in chronic dysentery of a butter (5 per cent.) and flour

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(3 per cent) paste added to whole milk. These forms of treatment should be given for a month at a time and repeated if necessary.

The diet otherwise consists of bone and vegetable soups, thickened with cereals, mashed potato, toast, custard, jellies, and fruit juice. As the mucus diminishes, green vegetables, eggs, lean meat and fish, and stewed fruits may be added

Medicinally, when the stools are frequent, bismuth salicylate, gr. v, sodium bicarb, gr v, with pulv triagacanth may be given, and silver nitrate, gr $\frac{1}{6}$, added if blood is present. Osmo-kaolin in teaspoonful doses is also useful. At other times, hyd cum cret, gr. $\frac{1}{2}$ to $\frac{1}{4}$, with sod bicarb. is administered

Antidysenteric serum, yatren, etc , are unnecessary forms of treatment for the mild type of case with which we are dealing. It is worth mentioning, however, that Rose⁵ in the convalescent stage of dysentery in cases presenting chronic diarrhoea with flatulent dyspepsia and hypo- or a-chlorhydria found that the administration of multivalent antidysenteric serum in doses of 5 to 10 c cm among other effects markedly improved the gastric acidity, estimated by gastric analysis.

DISCUSSION.

Evidence accumulates that the incidence of bacillary dysentery is greater than was commonly supposed. Within recent years the number of small epidemics and sporadic cases, especially among children, have been numerous. To account for this raised incidence, two suggestions may be advanced. One is that as an aftermath of war the number of carriers—among those who have had foreign military service—has been greatly increased. The other is a retarded recognition of the milder forms of the disease, and of the endemic nature of the infection. Nabarro and Distaso¹⁷ in 1914 drew attention to the frequency with which mild

The Treatment of Prolapse of the Rectum in Children.

By LIONEL E C NORBURY, M B, B S, F R C S

Surgeon to the Royal Free Hospital, to St. Mark's Hospital for Diseases of the Rectum, and to the Brompton Hospital for Children

PROLAPSE of the rectum is a very common complaint of babies and small children, especially those of the poorer class. Under this heading is included any protrusion of the bowel through the anal orifice. This may vary from a slight prolapse of mucous membrane to complete procidentia of the rectum. In children the prolapse is usually partial but may include all coats of the bowel.

Etiology.—Anatomically the rectum owes its support to several factors: (1) The curve of the sacrum, (2) The meso-rectum, (3) Levatores ani and sphincter muscles, (4) Peri-rectal fat and fascia. The reason why children are so much more frequently affected than adults is due, in part at any rate, to the shallow sacrum and poorly developed muscular structure. The chief disposing factor, in my opinion, in the causation of prolapse of the rectum in children is a congenital mal-development or atony of the external sphincter muscle, and not a giving way of the pelvic floor as in adults. The fibres of the external sphincter muscle in such cases in children are seen to be widely separated from each other, forming a broad band of poorly-developed muscular tissue.

Exciting Causes—(1) Wasting, with consequent loss of support from absorption of ischio-rectal and peri-rectal fat. All affected children, however, are not wasted or debilitated. (2) Straining, due to constipation, diarrhoea, rectal polyp, irritation from throm-

worms, phimosi, vesical calculus, whooping cough (Diarrhoea is often the result of prolapse and not the cause.)

Prolapse may occur in children of any age, but is most common from two months to five or six years. Prolapse occurs with equal frequency in either sex.

Symptoms may be very few, pain may be evidenced in young children by screaming when straining at stool. Other clinical features are irritability, loss of bowel-control, with passage of blood and mucus and consequent irritation and soreness of the anal skin—difficulty and pain on replacing the prolapse when extensive—associated urinary symptoms, with incontinence.

TREATMENT.

Palliative.—Any factor which produces straining should be attended to, e.g. constipation, phimosi, thread-worms or rectal polypus. Tonics and good food are important in weakly children. Cod-liver oil is especially useful both as a tonic and also as a means of increasing the adipose tissue of the body generally, including the peri-rectal fat, thereby supporting the rectum. Steps should be taken to prevent the bowel from prolapsing, since the more frequent the protrusion the more stretched and toneless becomes the already weakened external sphincter muscle. Cold-water compresses, which produce contraction of the sphincter, are useful. The bowels should be opened with an enema, the child lying in the recumbent and lateral position. The buttocks should be supported during defæcation by means of a broad piece of strapping placed just behind the anal orifice. Treatment on these lines will prove sufficient in a certain number of cases. If, however, such treatment fails, then operative interference is indicated.

Operations for the Cure of Prolapse of the Rectum in Children—These may be classified as follows: (1) For

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child strained at stool and sometimes also when running about. In some cases, an exciting cause such as phimosis was also present, but the degree of

FIG 1

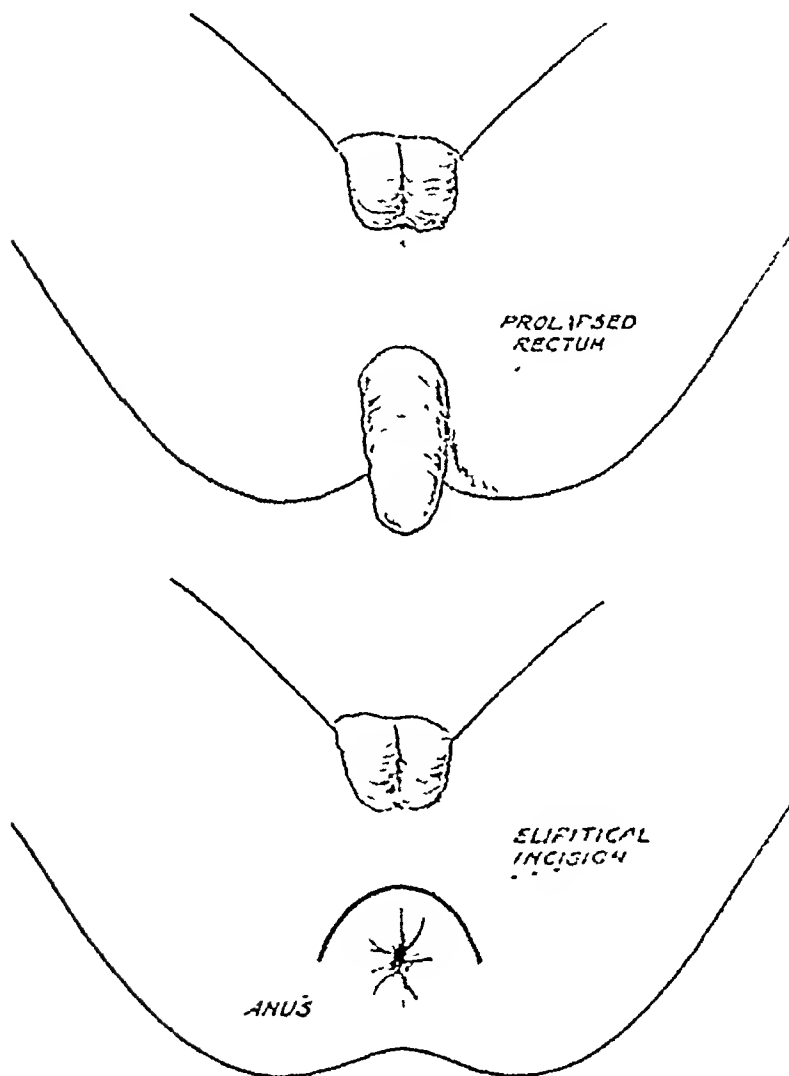


FIG 2

prolapse was such that circumcision alone would not have had any appreciable effect on the prolapse. In such cases, I have performed the simple operation of "pleating the external sphincter," as described below.

PROLAPSE OF THE RECTUM

The youngest patient was aged 10 months and the oldest 7½ years

Preparation.—The bowel is thoroughly emptied by means of a dose of castor oil followed by rectal wash-outs. The child is anæsthetized, the prolapse reduced, and the buttocks brought to the end of the table and raised on a sand-bag. A nurse holds the child in the lithotomy position. The anal skin, anal canal and lower rectum are cleansed with ether soap, followed by a weak solution of lysol and spirit

Operation — A semicircular incision is made anteriorly about ½ inch from the anal margin (see Fig 2). (At first I employed a posterior elliptical incision but found there was less likelihood of soiling an anterior wound by the subsequent passage of fæces) The external sphincter fibres are exposed on deepening the incision. The muscle-fibres will usually be found “splayed out” and forming a wide thin band, rather than a close-set ring. Care is taken not to penetrate the mucous membrane. The muscle fibres are fully exposed within the area of the incision. A series of interrupted sutures of catgut are used to “pleat the sphincter” as shown in Figs 3, 4 and 5. The anal orifice should by this means be narrowed so as just to admit the terminal joint of one’s little finger. It is better rather to overdo the narrowing of the sphincter than the reverse, since it is not uncommon for some of the sutures to give way during convalescence. The skin wound is closed by interrupted sutures of fine silk-worm gut, and a dressing of gauze and Whitehead’s varnish applied.

After-treatment —The bowels are kept confined for three days and are then opened by an aperient, preferably castor oil, followed by a small olive oil enema. The child is kept recumbent for fourteen days, or until the wound has healed. An evacuation is obtained daily by means of a soap and water enema,

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FIG 1

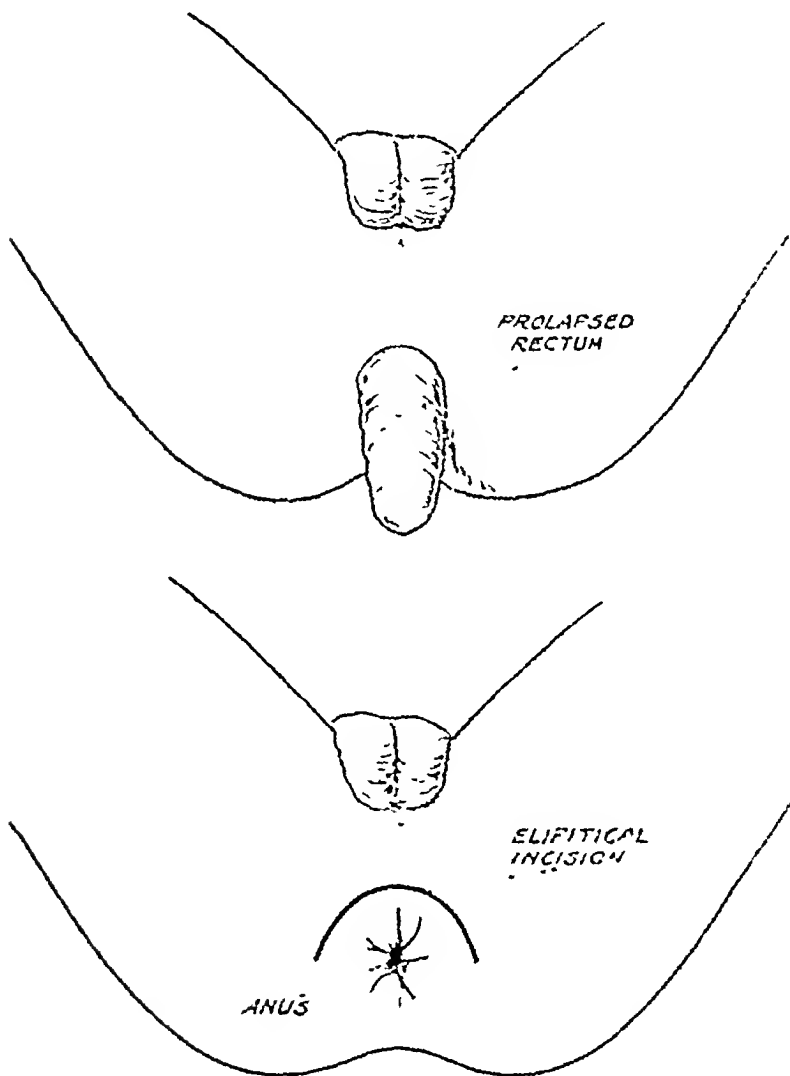


FIG 2

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Dwarfism and Infantilism.

By H GARDINER-HILL, MA, MD, FRCP

Research Assistant, Medical Unit, St Thomas's Hospital, Assistant Physician, Royal Free Hospital

DWARFISM and infantilism may be either hereditary abnormalities or symptoms of disease, and may be separate or combined. The differentiation of the various forms, the subject of this article, is often difficult. Only such types will be considered as fall within the realm of medical practice.

Dwarfism, a defect of stature alone, occurs as a separate entity in true hereditary dwarfism and achondroplasia. Both conditions are readily recognizable but neither will be discussed as they are not amenable to medical treatment. Simple rickets, if inadequately treated, may also result in stunting of growth, but in the other forms of rickets, those, for instance, accompanying coeliac and chronic renal disease, dwarfism, though the most prominent feature, is usually associated with some degree of infantilism.

The various forms of infantilism are difficult to classify, chiefly on account of the ambiguous way in which the term is used. Strictly speaking, it should be reserved for more or less permanent conditions in which the physical and psychical attributes of childhood persist into adult life. The purest example is seen in the so-called idiopathic or Loran infantilism. This strict interpretation of the term, however, is not generally adhered to and there is a tendency to include other varieties of partial or temporary delay in development in which the stage reached is less than that appropriate to the age of the individual. Such conditions are not infrequently the result of some temporary nutritional or glandular deficiency. As these cases form the majority of those seen in practice, this wider

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use of the term has been adopted in the present article. The chief practical problem of differential diagnosis lies in the distinction of the pathological from the physiological types, i.e. premature children who develop slowly and those with a family tendency to delayed development.

DWARFISM.

The three pathological varieties of dwarfism to be considered under this heading are those resulting from simple rickets, coeliac rickets and renal rickets

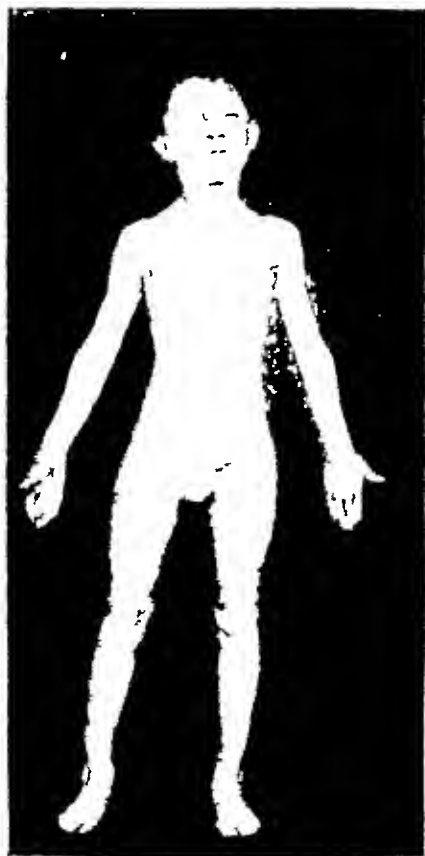


FIG. 1 (Case 1)—Male aged 19 Dwarf in result of infantile rickets

Simple Rickets—It is well known that gross defects result from untreated or imperfectly

DWARFISM AND INFANTILISM

treated rickets in infancy. In such cases, however, medical advice is usually sought for correction of deformity rather than defect of stature. Nevertheless, it is surprising how often children for whom medical advice is sought for defective growth alone, give a history of infantile rickets. Such cases make up 20 per cent. of the writer's series. This condition must, therefore, always be borne in mind when the problem of defective growth arises. Some of the stigmata of past rickets can always be found, and the skeleton is disproportioned and shorter in the lower measurements (symphysis-soles) than the upper (symphysis-vertex), the result of damage to the growing end of the long bones in early life. In rickety dwarfs, the intelligence and genital sphere develop normally.

Case 1 (Fig 1) A typical example is C.A., male, aged 10. History of infantile rickets. Sent for lack of growth at age of 10. Height 114 cm., weight 2 st 7 lbs., 16 cm. below average height and 2½ st below average weight respectively, symphysis-vertex 60 cm., symphysis soles 54 cm. X-ray showed irregular radial and ulnar epiphyseal lines. Tibial curvature is well seen in the photograph.

(2) *Cœliac Rickets*—In 1908 Herter described a condition, which he termed infantilism from chronic intestinal infection, resulting from an overgrowth of Gram-positive bacteria in the intestine and due mainly to a disturbance in the absorption of calcium from the bowel. The disorder usually develops about the second or third year and the chief symptoms are chronic indigestion, voluminous fatty stools and a remarkable stunting in growth. Signs of tetany, carpopedal spasm, may be present, and radiography shows marked osteoporosis of the shafts of the long bones, which tend to break rather than bend; there are also typical rickety changes at the ends of the long bones. The skeleton is disproportioned, the lower measurement being shorter than the upper. There may be retardation in general development.

Case 2 (Fig 2)—Female aged 18, is a typical instance. Height

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120.25 cm, weight 3 st 5 lbs. Infantile in appearance. Secondary sex characters undeveloped. No growth for some years. Stools greyish yellow. Total fat in faeces 39 per cent (soaps and fatty acids 86 per cent, unsplitted fat 14 per cent). Fig 3 shows the typical rickety changes at the radial and ulnar epiphyses.

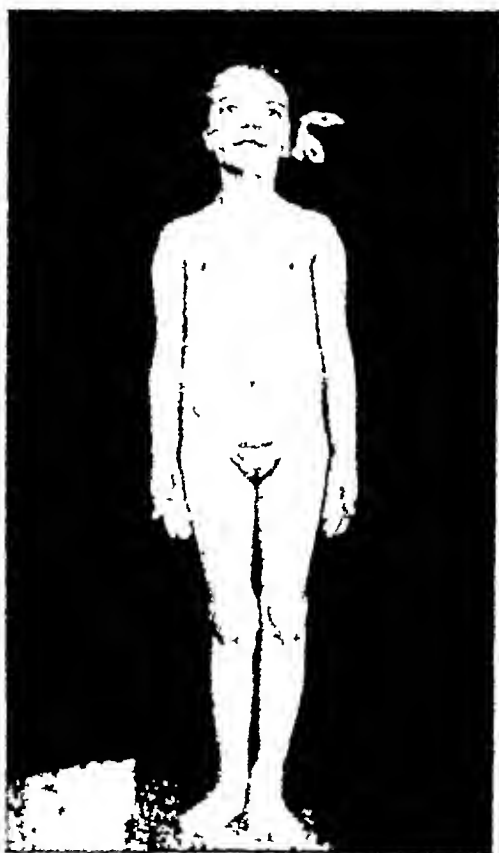


FIG. 2 (Case 2).—Female aged 18. Dwarfism and infantilism resulting from thyroid disease.

(3) *Renal Rickets*—This condition differs fundamentally from the other types in etiology, being due to the action of one or more retention products which the diseased kidneys are unable to excrete. It is found in association with chronic interstitial nephritis developing before adult life. It usually manifests itself about the 4th or 6th year and is characterized by severe stunting of growth. Genu valgum is a characteristic

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FIG 3 (Case 2)—Radiograph of hands of Case 2, showing rickets changes in radius and ulna



FIG 4 (Case 3)—Female aged 11 Renal dwarfism

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deformity. The radiographic changes at the epiphyses closely resemble rickets. The child may come under medical supervision for dwarfism (disproportioned), urinary symptoms or deformities. Renal function is impaired, mental development is unaffected, but the appearance of the secondary sex characters is usually delayed.

Case 3 (Fig 4)—A patient of Mr E P Brockman's, to whom I am indebted for these notes and the photograph, is a typical example A B, female, aged 11. Acute nephritis at three, which became chronic, genu valgum at 8. Between the ages of 5 and 7 the blood urea rose from 35 to 162 mg per 100 c cm. X ray photographs at the age of 10 showed changes typical of renal rickets at the ends of the shafts of the long bones. The well marked shortening of the upper leg measurement, so well seen in the photograph, is the result of backward displacement of the lower femoral epiphyses and absorption of bone at the lower end of the femoral shafts.

INFANTILISM

Before considering the various forms of infantilism, some mention must be made of two types of children figuring prominently in the author's series of cases of delayed development. The first are those born prematurely and abnormally small at birth, the second those with a clearly defined family history of delayed development. Both are physiological types and ultimately develop normally. Puberty, however, may be delayed until the age of 17 or 18 years. In differentiating these conditions from the pathological varieties the history is all important. It should be remembered that in both these physiological types the normal bodily proportions are maintained. Bone development, as shown by radiography, is up to the average for size though not for age, that is when comparison is made with a fully developed child of the same age. Using the term infantilism in the broad sense indicated in the introduction, the various forms may be classified into three main groups:—

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(1) Idiopathic; (2) Cachectic; (3) Endocrine

(1) *Idiopathic* — This is the so-called Lorain type or true infantilism, a comparatively rare condition for which no cause has yet been discovered. It is generally regarded as a freak of nature. The developmental disturbance affects the organism as a whole. There are not any signs of disease. These individuals are small and graceful. The abdomen is not prominent, the adipose tissue not increased, the genitals are diminutive but proportionate to the body size, and there is absence of pubic, axillary and facial hair. There is not any defect of intelligence, but the mind remains childish. Involution of the lymphatic apparatus is generally deficient. The bodily proportions are normal and as Meige has aptly remarked, the type resembles *un homme miniature*.

(2) *Cachectic Infantilism* — Almost any serious chronic malady in childhood may lead to delayed development. Chronic intestinal infection (Herter's disease) and chronic interstitial nephritis have already been quoted as examples, though in both these conditions, owing to the rickety changes at the growing ends of the long bones, dwarfism is generally a more prominent feature than infantilism. Nevertheless, as has been seen in Case 2, a girl of 18, the delay in general development may be very pronounced. Other cachectic conditions which figure prominently in the author's series of cases as causes of delayed development are underfeeding, abdominal tuberculosis, congenital syphilis, chronic dysentery, intestinal worms, scurvy and diabetes. In regions where malaria and hookworm disease occur, these conditions also are said to lead to serious delay in development. As an illustration of a severe metabolic disorder leading to delayed development, the following case of diabetes developing in a boy at the age of 13½ is interesting.

At that time he was said to be normally developed for his age

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For four years, from the age of 13½ to 17½, he was treated on a severely restricted diet without insulin, with the result that growth and development came to a standstill. When seen at the age of 17½ he was very under-sized. Height 5 ft, bodily proportions normal, weight 5 st 3 lbs. Bone development proportional to size. No signs of puberty. During the ensuing twelve months he was treated on a more generous diet with insulin, and not only grew 3½ inches in height but gained over three stone in weight. At the age of 18½ the secondary sex characters were beginning to appear.

This case illustrates a feature typical of conditions of so-called cachectic infantilism, namely, that the development of the individual is affected as a whole while the normal bodily proportions are maintained. Bone development also is proportional to size, though backward when compared to normal children of the same age. This is an important diagnostic difference from the thyroid and anterior pituitary conditions to be considered in the next section.

(3) *Endocrine*—There are three main groups of endocrine disturbances, thyroid, pituitary and gonad, which lead to defects in growth and delay in development.

(a) *Myxinfantilism*—The remarkable defects of growth and development due to thyroid deficiency are so well known that there is no need to do more than mention this type. The term myxinfantilism, thyroid deficiency developing in childhood, as distinct from cretinism, congenital thyroid deficiency, should only be applied to such cases as show sure signs of myxœdema. The myxœdematous alterations in the skin and the disturbances of intelligence are characteristic. Bone development is considerably retarded and below standard both for size and age, and the bone centres appear late. There is a typical lack of growth in the long bones resulting in disproportioned dwarfism. If these children are untreated, the appearance of the secondary sex characters may be indefinitely delayed. The following is a typical example.—

Case 1 (Fig. 5)—E.W., female, aged 13. No signs of puberty. Height 122 cm, 21 cm below average. Under thyroid treatment.

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for eighteen months this child grew at the rate of 15.7 cm per annum as compared with a rate of 1.8 cm per annum when thyroid extract was discontinued

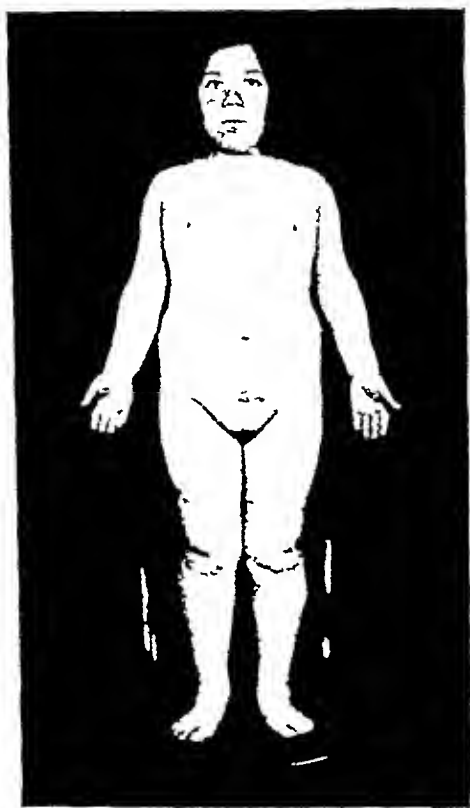


FIG 5 (Case 4)—Female aged 13 Myxomatosis

(b) *Pituitary Infantilism*—Modern work has shown the importance of the anterior lobe of the pituitary as a regulator of growth and sex development. Not only do experimental animals fail to grow and develop if this lobe is removed, but the defect can be remedied by intraperitoneal injection of anterior lobe extract.

Clinically, two different types of infantilism, resulting from pituitary deficiency in childhood, are recognized. First, Simmonds' disease, in which destruction of the anterior lobe is due to an ischaemic necrosis, the end result of infarction, septic or otherwise. Secondly,



FIG 6 (Case 1)—Radiograph of hands of Case 1, showing delayed bone development

Frohlich's disease, a deficiency syndrome due to compression of the gland by a parahypophyseal tumour. In both conditions, destruction of the anterior lobe results in dwarfism and infantilism. The outstanding difference between the two syndromes lies in the presence of tumour symptoms in the latter. There may, for instance, be found increased intracranial pressure, X-ray changes in the sella turcica, disturbances of vision, obesity or emaciation, polyuria or the reverse, the latter symptoms being probably due to pressure on the hypothalamus. Otherwise in both types there are certain features in common. Growth is defective, and the bodily proportions characteristic. There is a shortening of the lower measurement as compared with the upper, the result of inhibition of growth in the long bones. Retardation of ossification is similar to that found in thyroid deficiency, for the bone centres appear late and the epiphyses remain ununited. The mentality is alert and often somewhat

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precocious.

Case 5 (Fig 7) is an example of Simmonds' disease F V, male, aged 12 Height 105 cm (average for age, 140) Symphysis-vertex 54.5 cm, symphysis-soles 50.5 cm, weight 3 st 1 lb Shown in photograph beside his elder brother, aged 15, whose features and abnormal growth are suggestive of hyperpituitarism F V said to be small from birth with cessation of growth at age of 8, following measles No pathological changes in sella Bone development (Fig 8) approximates child of 7 years of age No evidence of puberty



FIG 7 (*Case 5*)—F V, male, aged 12 Simmonds' disease (anterior lobe pituitary deficiency) Elder brother aged 15

In twelve months, on anterior lobe pituitary extract by the mouth, grew 7.25 cm with corresponding advance in bone development

Case 6 (Fig 9) is an example of Fröhlich's disease J T, male, aged 14½ Height 136 cm (average for age 150), symphysis-vertex 69 cm, symphysis-soles 67 cm Weight 6 st 5 lbs Six months' history of headaches, dimness of vision, attacks suggestive of petit mal and a tendency to obesity No evidence of puberty Some contraction of visual fields, but no changes in optic discs No other changes in the central nervous system X-ray (Fig 10) showed calcified shadow in sella turcica Operation (Sir Percy Sargent) revealed adamantinomatous parahypophyseal cyst

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FIG. 8 (*Case 5*) —Radiograph of hands of F V, showing delayed development corresponding to child of 7



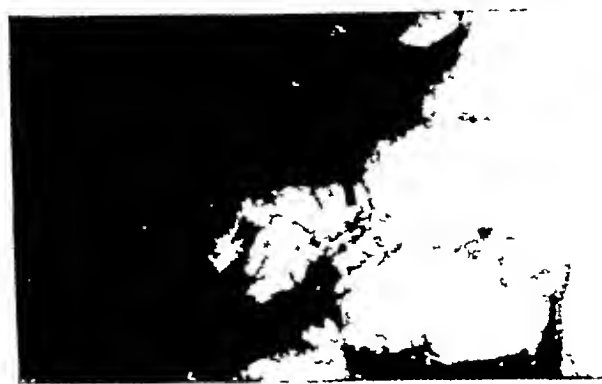


FIG 10 (Case 6)—Radiograph of sella turcica of Case 6, showing intrasellar opacity. Adamantinomatous parahypophyseal cyst

(c) *Eunuchoid Infantilism*—Myxinfantilism and pituitary infantilism with secondary changes in the genital sphere have been described in the previous sections. There remains for consideration a type of infantilism with bodily proportions of the eunuchoid type—primary gonad insufficiency. The following is a typical example —

Case 7 (Fig 11) male, aged 34. Height 131.5 cm, symphysis-vertex 55 cm, symphysis-soles 76.5 cm. Weight 5 st. 13 lbs. Well-marked tendency to obesity and skin changes characteristic of eunuchoidism. Neither testicle is palpable in the scrotum or inguinal canal, and there is a complete absence of facial, axillary and pubic hair. Radiography (Fig 12) shows that the epiphyses of the long bones are ununited.

This condition differs from the thyroid and pituitary types of infantilism in the excessive length of the limbs as compared with the trunk, and from true eunuchoidism in the defect of stature. In the ordinary forms of eunuchoidism the individual is tall, a feature which is ascribed to the persistence of growth in the presence of ununited epiphyses, the fusion of the latter being usually considered a function of fully developed gonads. It is possible that in the diminutive types the defect of growth may be the result of secondary changes in other glands, perhaps the anterior lobe of the pituitary, but the characteristic bodily



FIG. 11 (Case 7) —Male J. B., aged 31. Lunnchoid infantilism.

dimensions stamp these cases as being primarily gonadal defects in origin.

SUMMARY.

The most frequent causes of dwarfism as a separate entity in medical practice are the various forms of rickets, infantile, coeliac and renal, though the metabolic disturbances responsible for the two latter generally result also in some degree of infantilism. All these conditions are associated with characteristic bony deformities and disproportion of the skeleton, the lower length being shorter than the upper. Typical changes at the epiphyses are also shown by radiography in coeliac and renal rickets. In the differentiation of the

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FIG 12 (Case 7)—Radiograph of hand of Case 7, showing still ununited epiphyses

various forms of infantilism, it has been pointed out that in cachectic conditions, development is affected as a whole, the normal bodily proportions are maintained and bone development is up to standard for size. It must be remembered that in certain physiological states—premature children and those with a family tendency to delayed development—similar features are found. In distinguishing these physiological types from the pathological types the history is all important. In the endocrine cases, on the other hand, there are pronounced disturbances of ossification. In both thyroid and anterior pituitary deficiency not only do the bone centres appear late, but bone development is backward, both for age and size. In eunuchoid infantilism, on the other hand, the chief bony abnormality is the unusually delayed fusion of the epiphyses.

Open-Air Treatment and Clothing of Children.

By SIR LEONARD HILL, M.B., F.R.S.

Director, Department of Applied Physiology, National Institute for Medical Research

THE excellent results obtained by Rollier at Leysin, in Switzerland, through the open-air school treatment of delicate children, were an example to the world: he benefited those subject to catarrh, those debilitated by over-coddling and confined city life, or by measles, whooping cough, or rheumatic fever, and those who were over-nervous.

It is evident that not only to prevent disease and debility, but to secure vigorous young citizens, all children should be brought up on similar lines. The children under Rollier play games in the open air, stripped except for a loin cloth and shoes, both in winter and summer. They skate, ski, toboggan and snowball each other naked, bathed in the Alpine sun and calm freezing dry air.

There are great advantages of climate in Switzerland, but in England like advantages have been obtained from open-air schools with due attention to the different climatic conditions. In Salford, where the cold, wet, smoky atmosphere of a Lancashire town obtains, debilitated, rickety young children, taken from tenement dwellings, have been kept all through the winter in an open-air shelter, and a play-ground provided with no artificial heat except that used for drying clothes and warming food. Well fed and clothed, sleeping, playing and doing their lessons in the open air, they have become strong, and improved greatly in discipline and

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mental capacity Very warmly clad to start with, they soon cease to need extra clothing.

Other schools run on similar lines, prove that open-air life has a profound effect in preventing diseases and making children strong. A certain home for children was visited by the doctor every day, then an additional building was added with open-air dormitories. To this building the doctor came but once a month, and then there was little for him to do. A second addition was made with like result, then some new members of the governing body, possessed with the old-fashioned notions of the Victorian age, caused a third building to be added, this one with indoor sleeping dormitories. To this building, as to the old original one, the doctor had to come once a day.

The need for exposure to sun and air holds good no less for the successful rearing of chickens. Those confined within doors become rickety and do badly, while those kept out-doors, and given sufficient warmth and shelter from over exposure to weather become vigorous and keep healthy. The losses from incubator hatched chickens kept in artificial brooders, and confined away from the open air and sunlight, is enormous. So, too, in the Zoological Gardens experience has shown that animals confined in artificially warmed houses have a high mortality, while those allowed out of doors do well.

The next point to consider is what are the agencies which make for good health out of doors, and which are against good health indoors.

The Himalayan tribes, observed for nine years by McCarrison, are virile, fertile people living to a good age, and having none of the diseases of civilized life such as appendicitis, tonsillitis, colitis or cancer. Of first importance is their diet, consisting, as it does, of natural foods, whole meal, green foods, fruits, milk, etc., which must be contrasted with the white bread,

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margarine, meat and sugar of the city child. The one diet is sufficient in vitamins and salts and non-constipating, the other is deficient in all three respects. Secondly, there is the abundant exposure to the sunshine. We now know that rickets is due to want of exposure of the skin to the sun, and in particular to those ultra-violet rays of the sun which are powerful only in clear skies and with the sun high in the heavens. These rays, by acting on ergosterol in the fat of the skin, produce the anti-rachitic vitamin which is necessary for health, and in particular for the proper ossification of the bones.

This is one of the outstanding discoveries of modern medicine. Attempts are now being made to isolate this vitamin, but it remains to be seen whether it will be possible to separate those atoms, which are activated into vitamin by the knocking of electrons by a suitable dose, and destroyed by an over-dose of rays.

Success or failure of each experiment has to be laboriously tested by feeding experiments on specially reared young rats, carried out for a month and terminated by X-ray examination of their bones, spectrographic analysis of the solutions of ergosterol acted on by light being used as a guide. It is noteworthy that a small exposure of the skin suffices to produce enough of the vitamin to satisfy the needs of the body. Thus an exposure of white rats, for a few minutes a day and a foot away from it, to a mercury-vapour lamp is enough, the naked parts of the head affording sufficient area of skin to be acted on. Fur, feathers or clothes prevent the penetration of the rays. Leg weakness and high mortality, so common in chickens reared indoors, are prevented by the suitable use of arc lamps.

There is a poverty of lime salts in the ordinary city diet which requires to be made good by the addition of milk. We know that such addition has made a marked

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improvement in a group of boys at Dr Barnardo's Home, compared with a control group. Irradiation of the skin secures the best use of those lime salts which are in the food.

By their life in tenements, by over-clothing for fear of catching cold, and by their outgoings in perambulators, babies get almost no exposure to the sun. Bonnets, veils and perambulator-hoods are used to cut off the health-giving rays! Moreover, smoke pollution and clouds of dust stirred up in cities screen off just those ultra-violet rays of short wave length which are essential. In the winter the sun does not rise high enough for these rays to be potent even when the sky is clear. There is need then to amplify the sun by arc-light baths. The anti-rachitic vitamin can be added to foodstuffs such as milk by irradiation, or can be taken, prepared from ergosterol, in special pharmaceutical preparations.

Liver oil is a natural source, and hence the reputation of cod-liver oil. Nut-butter margarine requires to be enriched by the addition of liver oil so as to add not only vitamin D, but also vitamin A, both of which are present in milk and butter of cattle fed on grass. There are advantages in irradiation of the skin, other than the prevention of rickets. Irradiation is a sure method of treatment, while the giving at home of cod-liver oil, or some preparation containing irradiated ergosterol, may be omitted.

Light falling on the skin is partly reflected and partly penetrates and is absorbed. The ultra-violet rays penetrate only just through the horny layer of the epidermis and are absorbed by the living cells beneath and few reach even the most superficial capillaries. If these rays are intense, cells are destroyed and the inflammatory reaction of sunburn then results. The destroyed cells, which finally desquamate by thickening the horny layer, at once prevent deeper penetration,

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tion from the respiratory membrane. Saturated air at 0°C . holds about 5 grams of water vapour per cubic metre, while air saturated in the lungs at almost body temperature holds some 40 grams. The cooling power which the Alpine air exerts out of doors as measured by the kata-thermometer is some three or four times greater than in an ordinary room and the evaporative power twice as great. The air is cold and dry, but there is little wind, and the sun is warm, the conditions then are ideal. The heat production of the clothed resting subject is put up 40 to 90 per cent. in children exposed nude to the sunny, calm Alpine winter air. Increased appetite, better digestion, and more active breathing and circulation of blood result, and the growth of muscular tissue is enhanced by the need of heat production, and fatness and flabbiness opposed.

Sea-bathing puts up the heat production much more, e.g. to ten times the value obtained when the subject is resting in bed. It is obvious that only those cases will benefit from such exposure which can respond by adequate increased metabolism, digestion and absorption of food. Sir Henry Gauvain finds exposure to sea air at Hayling Island too strong for weakly young children; these do better at Alton. Their surface exposure is too great in proportion to their body mass, and their digestive powers too feeble. Stronger, heavier children do better at Hayling Island. Open-air treatment requires then to be controlled by careful observation of each case, and by good sense. Sir Henry Gauvain rightly lays great stress on the advantage of the change of stimulus from warmth to cold, light to dark and so on, the natural changes to which the skin of the naked wild man is exposed, and which given good food, result in splendid vigour, a glossy skin, great strength and power of endurance.

It is just as unwise to underclothe and expose

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children to open air all the time as it is to coddle them indoors all the time, for fear of their catching cold. An adequate measure of invigorating exposure and open-air games in all weathers is required with plenty of warm rest at other times, the indoor conditions being made good by ample ventilation of clean air. In the case of open-air schools the most important principle is to ensure that the children shall not sit for long at lessons, but every half-hour or so run and play for a bit to get warm, and after the mid-day meal have a long rest warmly wrapped up. Enough food and rest must be given to make up for the extra activity during exposure. Children of the very poor, crowded in tenement dwellings, need much less food at the expense, of course, of increased debility and liability to infection.

Vernon has found that children in open-air schools in wintry weather suffer a loss in manual dexterity owing to cold fingers, this must be countered by plenty of exercise taken between short lessons, and by under-floor heating of a very moderate degree to keep the feet warm. Absenteeism was found by Vernon to be very high in a very cold spell of weather, only half the children then attending an open-air school, through the restraining action of the parents. This is a matter, of course, of education of the parents in the knowledge that open-air school can be conducted not only without harm, but with great benefit even in such weather by wise control of clothing, activity and food.

Many children are over-clothed, particularly babies, the writer found one child wearing eleven garments, one over the other, and in addition a long bandage of red flannel wound round his body. By over-clothing the functions of the skin are weakened, while through dirty clothing parasites and infecting microbes work mischief upon it.

Cases of rheumatic fever from city tenements

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recover and do very well in sanatoria sleeping under verandas in damp, cold weather, and no less so with no woollen garments, but only warm cotton ones, and having no particular care given to protect them from cold and damp, but given, of course, plenty of good food. Rheumatic fever, as far as the statistical evidence goes, is produced by poor, crowded, dirty indoor conditions, not by cold and damp houses.

Observations, particularly of Dr. Kathleen Vaughan in Kashmir, have shown that a life spent from girlhood in purdah frequently results in deformity of the pelvis and difficulty in labour. Field and canal-boat women suffer from no such troubles, and like all natives living an open-air life, have their babies with the greatest ease. Natives have pelves which have mobile joints and a round-shaped opening, which easily permits the passage of the child's head.

In civilized people, as a result of sedentary life and rickety changes produced by ill-feeding, the opening of the pelvis loses its round shape, and the joints of the pelvis become immobile. It is then of the first importance that all female children should be allowed from birth free movement and exposure to the sun, together with a diet sufficient in vitamins and bone-building salts. Children should be trained to keep the pelvic joints mobile and the opening round by tumbling and squatting exercises.

Sedentary life, as babies first in perambulators, then as children on chairs, together with rickety deformities are the primary cause of suffering and loss of life of women in child-birth. A child should be clothed lightly so that its activity is not hindered, but warmly enough so that its heat-productive power is not over-taxed.

With regard to the warmth of clothing materials, it makes little difference of what fibre they are made for the insulating power is due to the woven texture in

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which air is immobilized. It is this air warmed and made humid as it is by the skin which prevents heat loss. Our clothes surround us with a tropical climate. To increase the heat loss the garments must be open and loose and allow the wind to blow through; to diminish it they must be windproof outside and entangle plenty of air in woven texture underneath.

Woollen garments are warmer when wet because they do not cling as cotton ones do to the skin, and so continue to entangle air which lessens heat loss. Wet garments cool the body greatly by evaporation, just as the sweat does. It must be borne in mind that evaporation of a gram of water takes away some 500 units of heat. There is no more harm in the wet garment than in a fomentation so long as the body is not chilled excessively by it. Well-aired dry garments are comfortable because they have great power to absorb moisture and become warm on doing so.

The Prophylaxis of the Nervous Child.

By ERIC PRITCHARD, M.A., M.D., F.R.C.P.

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BEFORE attempting to discuss ways and means of preventing nervousness in children, it would perhaps be as well to state what limitations I propose to set to the term itself, for nervousness is a word which covers a large number of sins of the nervous system. The late Sir Clifford Allbutt insisted that excitability was the specific function of the nerve cell, and that this quality therefore was physiological and not pathological. According to this view nervousness, in so far as it is synonymous with excitability, should be regarded as a virtue to be encouraged rather than as a fault to be repressed. Although as an abstract proposition many may agree with Allbutt's dictum, extreme degrees of susceptibility and responsiveness on the part of the nervous system are just as troublesome and embarrassing as those extreme degrees of indifference to the influences of the environment which are characteristic of amentia, morosis, and other varieties of feeble-mindedness, and yet the term nervousness is as often employed to explain the stupidity of children of inferior intelligence as it is to excuse the eccentric and abnormal conduct of children of superior mentality.

While fully recognizing the difficulty of defining the term nervousness so as to cover its many possible interpretations, it may be said at once that the form of nervousness which it is proposed to discuss here, and for the prevention of which I hope to make a few suggestions, is the kind of nervousness usually displayed by children of superior intelligence but with nervous

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systems which are explosive, uncoordinate, and unreliable in their reactions children whose behaviour is dictated more by the primitive emotions than by reason · children who are hable to manifest mild forms of phobia, who dream dreams, who walk in their sleep, who are swayed by strong likes and dislikes, or by loves and hatreds . children who are as a rule difficult to manage by suppressive methods but who are the easy victims of suggestion · children who form inferiority complexes, run away from school, later contract unfortunate misalliances and generally disappoint their parents. Nervous children of the type I propose to deal with, suffer from many varieties of tics, hustrionic spasms, nail biting, grinding of teeth, bed-wetting, cyclic vomiting, and anorexia nervosa.

To what extent nervousness of the kind which comes within the scope of my definition is inborn, and therefore inevitable, or to what extent acquired and therefore preventable, is a very difficult question, and I take it that no two authorities would entirely agree in any one particular case as to the relative importance of the two factors, heredity and environment. The view taken would, I think, depend on the class of case from which the formulator of the opinion derived most of his experiences, and the latter would naturally also influence the views of the former with regard to prophylactic measures The eugenist, the disciple of Mendel, or the follower of Weismann, might predict salvation in selected mating or in the sterilization of the unfit, the social reformer in the equalization of wealth and better housing; the teetotaller in prohibition ; the educationist in education, the sanitary reformer in hygienic measures, the dietician in diet; and other varieties of enthusiast according to their special creeds.

I remember a particular family of thirteen children—an unlucky number as it subsequently proved—whose father when I first met

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tism is a common contributory factor to headache, migraine, and neurasthenia. Loud noises or the ceaseless roar of city life may disturb the nervous equilibrium of nervously disposed children. Injurious impressions also travelling by way of the nerves of common sensation may, if they are extensive or unduly prolonged, interfere with normal nervous function. For instance, I have more than once been consulted as to the mental state of children suffering from severe eczema, while the irritation of scabies is also an occasional source of nervous symptoms, and from troublesome dentition there is hardly a manifestation of nervous instability of which I have not at one time or another had examples.

Although reflex sources of nerve trauma such as the foregoing are often to be discovered in the anamnesis of nervous children, probably a still larger proportion of them owe their origin, in part at least, to direct damage to the nerve cell by circulating poisons. To this group of cases of nervousness Soltmann has applied the term "Hæmatogenous Eclampsia" (Eclampsia Hæmatogenes), and by this term we are supposed to understand conditions of nervousness due to poisons of endogenous as well as of exogenous origin, that is to say, to substances taken into the system as food or medicine, such as coffee, alcohol, tobacco, lead, opium, belladonna, and many of the tar preparations, as well as the toxins generated by the organisms associated with rheumatism, syphilis, diphtheria, the exanthems and other infective conditions. It also includes the toxæmias connected with defective excretion. I would add to this long category of hæmatogenous causes of nervousness also certain of the deficiency diseases. One of these is the condition of spasmophilia which is due to a deficiency of calcium in the blood. But other deficiencies may have similar effects, as, for instance, the vitaminosis

Want of an adequate amount of the anti-neuritic vitamin (water-soluble B) may lead to any degree of nervousness from beri-beri to simple neuralgia, and probably many less well recognized deficiencies may have similar effects—for instance, deficiencies of iron, iodine and manganese may in their respective spheres of action lead to nervous symptoms of one kind or another. I hesitate to refer in greater detail to this matter, lest I exceed my space allowance before I come to the really important part of this article—namely, the manner of prevention.

Without some knowledge of the etiology of nervousness and neurasthenic states, it is a somewhat thankless task to look for means of prevention. For this reason I have described details of causes which may at first sight appear unnecessary, in the hope that my readers will draw from them their own inferences and therefrom shape their methods of preventive treatment.

Since the foundations of nerve instability are laid in infancy, it is obvious that we must seek for the indications of future nervousness during *that* period of life when the root of the evil can be attacked before it becomes too firmly established. The first symptoms that we should look for in infants are indications of hypersensitive reaction to impressions transmitted by the nerves of special sense and common sensation. Indications of hyperacusis, blepharospasm, myotonia, and especially flexor spasm, excessive crying, sleeplessness, respiratory irregularities such as hiccough, vaso-motor disturbances such as cold feet, digestive disturbances such as uncontrollable vomiting, colic and diarrhœa, should all attract one's attention to the possibility in the future of serious nervous developments.

My experience of nursery training schools convinces me that when nervousness in infants of this kind is treated by the well-ordered discipline and skilful handling which is usually to be found in such institutions,

the symptoms rapidly disappear. Nervous infants must be provided with what I suppose one may almost call abnormal environments, if they are to be expected to behave like normal individuals. They must be protected from all varieties of violent stimulation. Their irritable and erratic nervous systems must be schooled to habits of obedience and discipline by uniformity and regularity in the methods of training. The rule of absolute obedience is in my experience the key-note of the problem. Much harm can be done by irregular feeding, over-feeding, unsuitable feeding, and by any deficiency in nutritional essentials. Nervous systems inherently stable can be disorganized by toxæmias of acute and chronic infections. Protection from infections, either by raising the natural resistance or by the provision of a safe environment, becomes a very important element in the treatment. The inculcation of good habits of sleep is also important, because the more unstable the nervous system, the more is the necessity for rest and recovery.

To exercise and the development of the muscular system I attach considerable importance—both in their prophylactic and remedial aspects. Dr. H. C. Cameron has drawn attention to the stance and posture of the child as commoting the condition of his nervous system. There can be no doubt that the postures and movements of the child, as Dr. Francis Warner pointed out many years ago, help one to understand its mental state. If by suitable training and education the infant and young child can be induced so to develop its muscular system as to lead to the adequate control of its postures and movements, it is probable that a virtuous circle will be established between the development of the nervous system and the functions which it controls. For these reasons an infant should be encouraged to develop his muscular system by organized exercises while the tone of the muscles should be

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encouraged as far as possible by graduated cold baths and other hydropathic methods.

A great deal can be done by education and training to teach the infant how to control his respiratory, circulatory, digestive, and excretory systems. I attach very great importance to the control of the vaso-motor and heat-regulating centres. The connection between the emotions and the vaso-motor functions is so close that it is impossible to believe that one can be stabilized without influence on the other. Just as the education and training of organic functions is essential in the young baby as a prophylactic measure against general nervousness, so at a later date is the control and management of the emotions conducive to nerve stability, and in this connection the question of schools and schooling becomes highly important. Should a nervous child be sent to school or be educated at home is a problem which daily presents itself. The answer to this question is to be sought in the character of the home. Nervous children usually have nervous parents, and with nervous parents the atmosphere of the home is usually highly unsuitable for the development of nerve stability.

I believe in this connection we have much to hope for from the rational use of Child Guidance Clinics. It is impossible to believe one will not get better advice from those who have devoted much attention to the subject of the psychological treatment of children than from people who have paid no special attention to this important aspect of child management. Although most of us will agree that psycho-therapeutics can be overdone, and that more harm than good often results from methods of psycho-analysis, none the less it is fairly obvious that those who make a study of the simple everyday psychology of the child will know more about it than those who only look to the material

needs of the body.

This article would be incomplete without a few words about drugs, but it is obvious that in the treatment of so chronic a condition as nervousness the use of drugs either for prophylactic or curative purposes can play only a minor part. Nervousness, however, is so largely made in infancy and childhood that the employment of narcotics is justifiable as a temporary expedient if it can prevent an acute condition from developing into a chronic one. For spasmodic conditions in infancy and early childhood phosphorus (1 in 10,000) dissolved in cod-liver oil is a sovereign remedy—from one to three drachms a day is sufficient. In combination with this, mixed alkaline salts with calcium lactate should be given daily as a morning draught, while the bromides and luminal given in full dosage are excellent in emergencies.

The Treatment of Infantile Tetany.

By CHARLES F HARRIS, M D , M R C P

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DURING the last fifteen years the treatment of infantile tetany has been removed from an empirical to a rational basis. This advance has not been without its false starts, and many side issues of doubtful practical value remain to be explored. This seems a suitable opportunity to examine the ground that has been gained and to consider how the present knowledge can be put to its greatest use. Reference to the work of the many investigators, who have made this progress, has not been included. MacCallum's review of the pathogenesis of tetany contains a very considerable bibliography up to 1924. Since that time attention has been directed for the most part to testing hypotheses and elaborating treatment.

In order that a reasonable treatment should be evolved, the conception of infantile tetany as a disorder has been widened. That is not to say that other forms of tetany in infancy have been included in its scope. It is well known that from time to time tetany follows the vomiting in a case of pyloric stenosis, or results from large doses of alkalis, or complicates the final stages in grave disorders of the liver. With none of these varieties are we concerned here. What has come to be realized, however, is that infantile tetany may be present for long periods in a form which gives rise to no symptoms to alarm the patient's parents. The disorder is essentially an alteration of the calcium metabolism which results from deprivation of a

vitamin. When the conditions leading to a lack of vitamin D have been present for a sufficient time, the calcium in the serum begins to fall from its usual level of 10 or 11 milligrammes per 100 c.cm. of blood. If it falls low enough, that is to say below about 6 milligrammes per cent, the nervous system becomes so irritable that one or other of the symptoms of tetany appears. More usually the level of the serum calcium does not immediately drop to this low level, but stops short at about 7 milligrammes per cent. In this case none of the obvious signs of tetany are present and may never appear. Usually some slight intercurrent disturbance, constipation, a cold in the head, or the like, upsets the child a little and just turns the scale. The calcium drops a milligramme per cent., and symptoms of tetany present themselves. It is evident, therefore, that infantile tetany has two phases, which may be called manifest and latent tetany.

The symptoms of manifest tetany are varied. Laryngismus stridulus and convulsions are most often complained of; carpopedal spasms, in spite of their notoriety, are a poor third as regards their frequency in the histories. Another symptom, that is not often detected by a lay observer, is a little crow at the end of a cough. This is related to the laryngismus, but there is no check in the respiration with it. Often a patient has more than one of these symptoms.

In latent tetany, while there are no symptoms, the objective signs are as easily elicited as in the manifest phase. The facial nerve is so irritable that twitches of the appropriate muscles can be produced by tapping any of its three main branches. A carpal spasm follows quite moderate constriction of the arm. In children under the age of five, changes in the electrical reactions of muscles give very exact indication of the amount of irritability. A precise account of the changes in the reactions would be of little value, for

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each observer has his own technique for eliciting them and consequently evolves his own standards. In the main the criteria are, a lowering of the amount of current to produce each of the contractions, anodal reversal, that is to say that the anodal opening contraction takes place with a smaller stimulus than the anodal closing contraction, and the occurrence of a cathodal opening contraction with a current of less than 5 amperes. Such changes in the electrical reactions make their appearance and become more marked in proportion to the lowering of the calcium in the serum, and they are quite independent of the obvious symptoms of tetany. Next to the actual estimation of the serum calcium, they constitute the most useful measure of the severity of the condition.

The vitamin deficiency which gives rise to the chain of events leading to tetany, has its origin primarily in faulty feeding. A number of circumstances, however, tend to mitigate the effects of a deficient diet, so that the relation of tetany to feeding is not immediately clear. For instance, a baby born at full term is provided with enough vitamin to last it for about six months. However deficient its diet may be, the effects of this do not begin to become evident until the six months have passed and the initial stores are used up. A premature baby, on the other hand, has a very much smaller store when it is born. It is well known how readily such babies acquire rickets and tetany. Unless the period of immunity possessed by a full term child is recognized, the vagaries of the onset of the condition are very mysterious. The same applies to the effect of sunlight. A baby, who is being given a diet deficient in vitamin D, but who is at the same time exposed to sufficient sunlight, does not come to have either latent or manifest tetany. The prevention of tetany may be explained on the hypothesis that the ergosterol in the baby's circulation

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process may be likened to that of keeping a sieve reasonably full of water by turning on enough taps.

Obviously the calcium metabolism must be restored to its normal working order. The fundamental treatment of infantile tetany is concerned in doing this, and consists in replacing the vitamin whose absence brought about the disorder. Irradiated ergosterol seems to have all the qualities of the hypothetical vitamin D, and, therefore, deserves the first consideration for this purpose. It is sold under a variety of proprietary names, and under none of them has it been found to have any objectionable qualities. The chief merit of irradiated ergosterol for the treatment of tetany is its small bulk. The dose given daily should be equivalent to 1,000 units; usually this does not exceed a few drops, and it can be put in the food or concealed in orange juice or something else that the child likes. Its effect on the level of the serum calcium is not immediate. There is a delay of a few days before the figure for this begins to go up, and the normal level may not be reached for two or three weeks. Naturally a sufficient vitamin intake must be kept up after the return to normal, in order to prevent a relapse. But so high a dosage need not be continued; it is often more convenient to substitute another source of vitamin D at this stage. A cure of tetany can be effected equally well by using cod-liver oil. This drug has certain advantages over irradiated ergosterol for this purpose, and these compensate to some extent its disadvantages of greater bulk and unpleasant taste. It is more readily obtained, and there are present in it other accessory food factors besides vitamin D. In using irradiated ergosterol, one is going straight to the mark in replacing the vitamin whose absence has made it self felt. But an infant, who is suffering from the lack of one fat-soluble vitamin, is in all probability not inherently supplied with the others. Cod-liver oil

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contains vitamin A, and, perhaps, other less clearly defined factors, so that its use in treating tetany carries with it certain indirect benefits. An oil well tested for its vitamin content should be chosen. During the cure of tetany, from four to six drachms a day should be given. Afterwards, for maintenance, the dose may be cut down to a third of that amount. The time taken to re-establish a normal calcium metabolism is not much longer when cod-liver oil is used than with ergosterol. Tetany may also be cured by exposing the patient to ultra-violet light, but it is not often advisable to rely on this method alone. It does not matter whether the light is artificial or natural, and the possibility of obtaining long enough exposures usually determines which shall be used. Reference has been made above to the hypothesis that the light produces its results by irradiating the ergosterol already in the circulation. If this is true, the effectiveness of exposure to ultra-violet rays will vary with the amount of unirradiated ergosterol available in the patient. Where there has been a deficient intake over a long period, the demand on the residual ergosterol must be very high and it would seem more reasonable to supply more of the material for the light to work on. In any case, the rate of recovery when ultra-violet light is used is much slower than when the vitamin is supplied by the mouth. Only exceptional circumstances would warrant the use of light by itself.

The criterion of recovery from infantile tetany is the return of the serum calcium to its normal level. This indicates that the calcium metabolism is again working normally. The physical signs of tetany disappear when the calcium in the serum rises above about 8 milligrammes per cent. The patient cannot be considered cured until the level has risen to the normal 10 milligrammes per cent. There is, therefore, a silent stage between 8 and 10 milligrammes per cent., during

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and more important. They do not merely require advice about the means of palliating their limited existence, but they usually need active treatment, and the prognosis depends upon the accuracy with which the mode of treatment is selected. In general, it may be said that drugs play no part in this treatment.

The treatment indicated depends entirely on which neurones are damaged, and the first essential step is to settle this point with certainty; no therapeutic measures should be initiated until this has been done. Damage to the lower motor neurone is usually recognisable without great difficulty by the presence of muscular atrophy, flaccid paralysis, loss of deep reflexes, and perhaps trophic change. If any doubt is felt, the aid of electro-diagnosis should be obtained. Rather more difficulty may be presented by rigid muscles, as to whether the rigidity is due to a pyramidal or an extra-pyramidal lesion. The lead-pipe rigidity of the latter is usually associated with tremor and not with altered reflexes. A point to be remembered about the pyramidal lesions of infantile origin is that the abdominal reflexes are usually retained.

Cases of old-standing poliomyelitis present a variety of orthopaedic problems, but apart from this there is little to say about their actual treatment. Any flaccid muscle which reacts to faradism may benefit from its use, and in any case it can do no harm.

Children who have suffered damage to the upper motor neurone, and whose affected muscles are spastic, require to be treated on entirely different lines. They constitute a fairly large group of patients about whom the practitioner will frequently be consulted during the school age, particularly as to their mode of life, the type of school that they can go to, and the extent to which they can participate in ordinary children's activities. In the great majority of them the medical

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adviser will be able, not only to render assistance in this way, but to bring about a definite improvement of the condition. He will in most cases be faced with one obstacle, i.e. that the relatives have firmly implanted in their minds the idea that electrical stimulation will do them good. It is well to take the initiative in warning them that it must be avoided at all costs. Massage will do no harm, I have never seen a case in which it did good.

This type of case will include diplegias, hemiplegias, and occasionally monoplegias. Their origin will be varied; it may have been pre-natal disease, intracranial hæmorrhage at birth, residua from cerebro-spinal fever or polio-encephalitis, or thrombosis during a specific fever; in many cases it will be a matter of doubt and of no great practical importance. The points of greatest significance are the degree of muscular spasm, the condition of the child's intelligence, and the presence or absence of fits. On being confronted with a child of this kind, the first consideration is whether any immediate measure can increase its activities. This is ascertained by examining the range of passive movement, if this is restricted, orthopædic measures must constitute the first step. If passive movement is full, but active movement is restricted by spasm, there is scope for great improvement provided that the right lines are followed. The spasm will only be reduced by *habitual* active movement; a few hours "re-educational" exercises do not often produce much result. Often it is necessary to combat an entirely mistaken idea of the parents that the child "needs rest." The exact measures to be introduced depend on the amount that the child can do. A type of case commonly seen is a child between the age of 5 and 8, with a residual hemiparesis, who walks with a slight limp only, but whose affected arm is stiff and clumsy, and is therefore little used. The one effective initial procedure for

this child is to immobilize the sound arm by a splint, or by bandaging it to the chest. As the result of this all movements which the child wishes to make, and all reflex responses, are made by the paretic arm, and "re-education" becomes automatic. After some weeks, when the habit of using the paretic arm has become established, the sound one may be liberated, at first for a few hours in the day, and subsequently for longer periods. The time has then come for encouraging activities which entail strictly bilateral movements, one of the best of these is provided by a wheel-barrow loaded with stones, and a more advanced one by a skipping-rope.

Cases of diplegia usually present rather more difficulty. Some of them when first seen will be unable to support their weight; they should be supplied with a wheeled frame with adjustable crutch supports, in which they can learn to use their legs. At a slightly later stage they are able to support their weight, but not to maintain their balance. The frame should then be removed and replaced by a doll's perambulator, which the child can push. Perseverance with measures of this kind will result in some degree of improvement in all cases of moderate spasm, and in many will achieve a result which is little short of recovery.

Advice is frequently sought on the question of the educability of these children, and the type of institution which is most suited to their needs. This is often a difficult question as well as an extremely important one. I think it is true to say that nearly all of them are - potentially at any rate - more intelligent than they look, and it is of special importance that they should have adequate educational opportunities, since their physical outlets are necessarily limited. While one may regard the majority of them as suitable for the education received by normal children, there are other considerations which render it advisable to send them

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to schools where they will associate with them, and these objections apply far more strongly to boys than to girls. It has frequently happened that one of these children, thrown into competition with his more fortunate fellows, though able to hold his own fairly well in the class-room, appeared to have deteriorated in character, becoming "difficult," rebellious, or spiteful. This is nearly always the result of the sense of inferiority to which a physical handicap renders a child so liable; unable to vie with the other at games, he compensates in undesirable directions, and obtains his share of attention by acts of bravado or insubordination. That it is *not* the direct result of cerebral damage I feel sure, from the improvement in temperament which usually follows the removal of the child to a different environment. Among the children of the well-to-do the best course is to send the child to an establishment specially intended for the physically subnormal, where a small number are educated together, and where particular attention is paid to handicrafts. At a later stage a proportion of them will have made sufficient progress to take part in the life of a public school. Children of the hospital classes probably derive most benefit from education in special schools for cripples, even if their disability is not great.

There is one symptom which is found not infrequently in diplegic (and occasionally in hemiplegic children) which deserves mention because it may be misleading, especially on the question of prognosis. Dysarthria, or, in fact, any disturbance of articulation, including delay in its achievement, is in these patients merely a result of the rigidity of the muscles of articulation. The prognosis is good, speech usually becomes normal or nearly so, but at a much later age than in the normal. The resemblance which this dysarthria bears to that found so frequently in mental

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Children are sometimes referred in a slight and being regarded as usually defective and need of some form of special education, when this is not the case. Neither failure in learning to read nor continuance of articulation should be regarded in any way indicative of mental defect in children who suffer from parastrophias. Nevertheless ignorance constitutes a strong contra-indication to education of such young normal children, for it will, more than anything else, subject him to ridicule and tend to isolate him from his companions.

The cases referred to above comprise a group in which the results will often be a source of satisfaction to the medical adviser, and concerning them he will be able to instil a spirit of optimism into the minds of the parents. In dealing with the other group of children whose disabilities are progressive, the practitioner is called upon to assist in fighting a battle which is usually a losing one, and in most cases he will have to protect the interests of the relatives by enabling them to recognize and accept this fact. It should be clear to them that it is useless to spur these children to take part in activities which they find difficult while for parastrophic children this is usually necessary. In order to bring the parents to a realization of the situation it is necessary that they shall be given some idea of the prognosis, and the question of prognosis is the most important one which arises in connection with patients of this type.

The two groups which may be taken as typical progressive mild paralysis are the abiotrophics and the myopathies. Both these groups exhibit a strong tendency to run in families, so that it is not unusual for the practitioner to be called upon to direct the regime for two or more of these patients in the same household. Distressing as this situation is for the parent, it undoubtedly facilitates the arrangement

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of a suitable mode of life for the children

Of the abiotrophies, in which certain neurones undergo degeneration during childhood, Friedreich's disease is the commonest; other forms of hereditary ataxia result from similar processes in varying situations. The prognosis is bad, but the course is often extremely slow, and there is some prospect of the patient being able to make fair use of the limbs, or even do unskilled work, up to the third decade. The mental state of these children tends to be somewhat below par, but it is exceptional to meet with true mental deficiency in them. The greatest disability is usually in the legs, and it is worth while providing them with a fairly simple education, and teaching them handicrafts, such as basket-making and netting. They should be encouraged to walk as long as they are able to do so. If the myopathies, the form most commonly met with is the pseudo-hypertrophic one, which affects the subcutaneous muscles. In this the prognosis is extremely bad, for life is so short as for muscular function, few of them reaching adolescence. For this reason it is not justifiable to do much for them in any way, either in education or in physical activities, and the only service which the medical adviser can do on their behalf is the somewhat difficult and thankless one of securing recognition of the fact. The same remarks apply to cases of spinal muscular atrophy. There is one class of children who suffer from spastic lesions which falls into this group and not into the first one, I refer to those who exhibit persistent hyperkinesia, whether choreiform or athetoid. For them the prognosis as regards life is not necessarily bad, but in my experience the results of any active measures to reduce the spasm—whether re-educational or operative—have always caused disappointment. In addition to this they are usually incapable of benefiting from any but the simplest education.

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appear that the only symptoms common to the two disorders are the pain, redness, and swelling of the feet and hands. Petten states that the symptoms of aerodynia were typical of chronic arsenical poisoning, and very similar to those observed in the epidemic of arsenical poisoning in beer drinkers in England in the year 1900. He believes that aerodynia was due to the drinking of wine contaminated by arsenic.

One other theory as to the causation of pink disease must be mentioned, namely, that it belongs to the group of deficiency diseases. This possibility was suggested quite early in the investigation of the disease, but dismissed because there appeared to be no error in dieting and also because cases were observed in breast-fed children. The latter is not a valid objection because infantile scurvy and beri-beri have occurred in breast-fed infants, yet both of these are now accepted as deficiency disorders. The question has been raised again because of some interesting animal experiments by Marshall Findlay. If young rats are fed on a diet in which the sole source of protein is dried egg-white they develop a dermatitis, nutritional and nervous symptoms which show a striking similarity to pink disease. This condition may be cured or prevented by the addition of dried yeast—but not marmite—to the diet. Findlay also found that the rats showed pathological changes in the neurons which were indistinguishable from those which have been observed in some cases of pink disease.

The pathology of pink disease has not been definitely settled. In some cases there is evidence of peripheral neuritis, inflammatory changes, and small-celled infiltration in various parts of the medulla and cord, whereas in others no evidence of peripheral neuritis has been found.

Symptomatology—The clinical picture presented by a fully-developed case is so striking that one having

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been seen and recognized it can never be forgotten. The age of onset varies from three to four months to six or seven years, but most of the cases occur between the ages of nine months and two years, and it is only rarely seen over four years. The first symptom observed by the parents may be the condition of the hands and feet or the rash, but as a rule there is a history of a recent febrile illness of somewhat indefinite character. This prodromal illness, described in some instances as "influenza," and which usually shows catarrhal symptoms in the nose and throat and only occasionally diarrhoea and vomiting, may last for some weeks, or, indeed, may improve, before the rash appears. In other cases the symptoms of the prodromal illness are restlessness, general misery, and insomnia, certainly in all cases such symptoms occur with the onset of the rash and increase in severity until the complete clinical picture is produced.

In a well-marked case the most outstanding features are the condition of the child's hands and feet and his utter misery and wretchedness. If carried into the room he lies limply in his mother's or nurse's arms, his head drooping forwards on to his chest and his eyes turned away from the light, or he may bury his head in his mother's shoulder. When it is possible to see his face the eyes are found to be screwed up and half shut and the expression one of abject misery. The nose may be reddened and there may be erythematous patches on the chin and cheeks; frequently the mouth is opened and from it there may be a constant dribble of saliva. The child soon turns its head away again and often gives expression to the misery from which he suffers by a continuous whining cry. He does not remain still for long, but squirms and twists in his mother's arms, scratching his body viciously or rubbing his hands together or rubbing one foot over the other. In some cases the misery is so intense that

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the child plucks at his hair and may pull it out by the roots. The trunk is almost entirely covered by an intensely irritating, fine, milia^{ry} rash, most marked in the napkin area, and least frequently seen on the extremities. The hands and feet are garnet-red or bluish-red in colour, swollen, but not cedematous, cold to the touch and may show desquamation or even some loss of substance of the digits.

The child often resents all attempts at examination, it may, nevertheless, be possible to interest him for a moment or two, but in a very short time a look of pain and misery passes over his face, the eyes are tightly closed and his head flops forward once again on to his mother's shoulder, loud crying and vicious scratching are recommenced and the picture of intense irritability and distress is again resumed.

If the child be observed for the first time in bed, he is frequently found lying curled up, with his head buried in the pillow, which is soaked with saliva, or he may have assumed the "penknife" position, that is, the head face downwards resting between the feet. The child never remains still for very long, but makes squirming movements of the body to enable him to rub himself and so allay some of the irritation. Rest therefore becomes difficult, and sleep very disjointed. The patient dozes for a short period, then wakes suddenly and commences to scratch, scratching continues until through sheer exhaustion the child falls forwards again in sleep, only to waken up after an interval and repeat the process. On drawing down the bed-clothes a peculiar mousy odour may be noted and perspiration is observed to be very marked. Usually there is an extreme degree of wasting, particularly prominent in the adductor muscles of the thigh and abdominal wall. The mouth may show gingivitis, ulceration, and there may be loss of teeth.

The picture presented by the child's nurse or mother

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is in its way as typical as that presented by the child, and might with truth be regarded as part of the symptomatology of the disease. She is thoroughly worn out from lack of sleep and rest and from her unavailing efforts to soothe and relieve her sick child. Some of the symptoms may now be considered in greater detail.

The cutaneous manifestations are twofold—a miliaary rash and the erythematous condition of the hands and feet.

The miliaary rash consists of pink or red papules varying in size from a pin-point to a pin-head, which are associated with intense itching and profuse perspiration. The rash may vary in intensity from day to day with the degree of perspiration, it may also become infected by scratching, so that a severe dermatitis and pyoderma may result and even actual loss of surface and deep ulceration. Ulceration is perhaps most frequently observed in the genital regions, and as a result of infection enlargement of lymphatic glands in the groin and axillæ may occur. At times the rash disappears and later reappears, and, since it presents some resemblance to the rashes of German measles and scarlet fever, mistakes in diagnosis are not unknown.

The erythematous condition of the hands and feet is absolutely characteristic of the disease. These are affected symmetrically, are swollen and of a dusky bluish-red colour as far as a point just above the ankles and wrists, from whence the swelling and colour gradually fade away. They appear as if they had been dipped into boiling water, or an even better simile is Snowball's description of them as "raw beef hands and feet." They are cold and clammy to the touch; under pressure the colour fades, returning but slowly, and there is no pitting. During the stage of recovery the colour appears to be bluer than in the acute stages. The swelling of the fingers and toes

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not only limits movement, but gives the nails an appearance of being sunken in the nail bed. In many cases desquamation occurs. This is most marked in the palms and soles, and in some instances large areas of thickened corneal epithelium may be shed. Desquamation, like many of the other symptoms, varies in degree during the course of the disease and at some periods may not be present. Scratching and wringing of the hands may produce ulceration; the nails may be shed and in the severest cases gangrene may lead to loss of terminal phalanges. The erythema also sometimes affects the tip of the nose, the cheeks, the chin or the ears, but may only be of a flitting character.

The nervous symptoms are many and varied, and are of such a nature that led Feer to make the suggestion that the disorder was a vegetative neurosis. Thus, in addition to the cutaneous symptoms, the extreme irritability and mental upset, there are insomnia, excessive perspiration, profuse salivation, hypotonia, wasting, photophobia, alopecia, trichotillomania, tachycardia (160-180 per minute), raised blood pressure, anorexia, asthema, also at times diminished or absent reflexes and alterations in sensation. Insomnia is one of the earliest symptoms. It is severe in degree and, as a result, the little patient becomes quite exhausted. This lack of sleep is chiefly due to the pruritus, and since the latter appears to be worse during the night than the day, not infrequently the only period at which the child obtains sleep is in the early morning. Anorexia is very marked and sometimes the child refuses all food for quite long periods. Wasting, which to a large extent depends on the anorexia, is also severe in degree and constitutes one of the earliest symptoms of the disease. It is most marked in the adductor regions of the thighs, where the skin may hang in loose folds, on the abdomen, and around the shoulder girdle. Associated with the wasting is

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hypotonia, and not infrequently a diminished muscular power, so that the child may "go off his legs," may lose the power of sitting up or even of holding up his head. This degree of hypotonia and wasting explains why the child is able to assume extraordinary attitudes, such as the "penknife" position. Another characteristic symptom is photophobia which, like the rash, varies in intensity from time to time. The photophobia is usually not severe, but is such that the child screws up his eyes and turns its head away from the light and is the reason why the child so often buries its head in the pillow or in its nurse's shoulder.

There are certain other nervous symptoms which have been interpreted as evidence of polyneuritis. These signs are not constant and often, it must be confessed, do not carry conviction. Thus, the knee and ankle jerks are sometimes diminished or even absent at some period of the disease, whereas at other periods they may be normal. In some cases there certainly does appear to be some blunting of the sense of pain, as evidenced by the ability to bear with apparent impunity severe pin pricking or even an incision. The pruritus, the constant squirming movements of the body, the wringing of the hands and rubbing one foot over the other, have been regarded as due to paræsthesiæ.

The condition of the mouth is often of great importance. The lips may be sore and inflamed, and gingivitis and stomatitis varying in degree from slight manifestations to severe ulcerative conditions are usually present. Ulceration of the cheeks may lead to a condition resembling cancrum oris, and severe ulceration of the tongue may also occur. Gingivitis may induce falling out of the teeth and even necrosis of the jaw. Teeth may therefore be swallowed, and one mother's chief complaint was that her child had passed four teeth in his stools. Profuse salivation is a very constant symptom

and adds to the general misery of the child.

Respiratory symptoms.—Catarrh of the upper respiratory passages is of very frequent occurrence and, indeed, may be the first symptom. There is usually a more or less constant mucopurulent discharge from the nose; sinus infection and otitis media with its complications may be observed. Pharyngitis is common and not a few patients develop bronchitis. There is a very definite tendency to broncho-pneumonia, a very serious and often fatal complication, in which death sometimes occurs with unexpected suddenness.

The only other symptoms that need be stressed are the frequent occurrence of a polymorphonuclear leucocytosis (15,000 to 40,000), and the occasional presence of pyelitis. The disease runs a very prolonged course, lasting from three to six, or even nine months. As a rule there is no fever, but some pyrexia may occur in the initial stages or with the occurrence of complications. The course of the disease is marked by ups and downs, the symptoms improving to a certain extent, and then increasing in severity again. The best indications of real improvement are diminution in severity of the insomnia and anorexia.

Prognosis in the absence of severe complications is good, and once recovery has occurred it is complete, relapses being unknown. Uncomplicated pink disease probably always recovers, but complications, such as broncho-pneumonia, miliary tuberculosis, and furunculosis, are very fatal.

Treatment.—The results described in the section on etiology (p. 147) are highly suggestive, and as no specific treatment for the disease has been discovered, the administration of dried yeast should be given a trial. Otherwise the main lines of treatment should be directed to combating the anorexia and insomnia, and to this end careful and efficient nursing are absolutely essential. If possible the child should be nursed

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out of doors, the eyes being protected from any direct sunlight. The clothing should be changed frequently, and silken or cotton garments should be worn next to the skin, because woollen clothes increase the amount of perspiration, and therefore lead to increased scratching. It may be necessary to restrain the child's attempts at scratching by putting on gloves and encasing the arms in millboard.

Every attempt, including gavage if other means fail, must be made to induce the child to feed. The diet should be that suitable for a normal child of the same age and should contain a good supply of vitamins.

Meticulous attention to all nursing details will prove more efficacious in the treatment of insomnia than drugs, although phenazone sometimes appears to be helpful. Ultra-violet irradiation has been proved to be a valuable remedy in the general treatment of the disease and is also helpful in producing sleep

Problems Outstanding in Juvenile Rheumatism.

By REGINALD MILLER, M.D., F.R.C.P.

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THE greatly increased interest which of recent years has been taken in juvenile rheumatism has concerned itself chiefly with the disease as a problem in public health. For a very long time the clinical side of the infection has been studied in greatest detail, but now, at long last, there has developed a movement to view the disease as a whole, to study the mass production of it in this country, and to consider what is to be done towards its prevention and control. To this end, numerous "rheumatism supervisory centres" have been established in the great towns (in London alone there are more than a dozen of them already), and in these are being made efforts, not only to benefit the individual children, but to get to grips with the disease on a large scale. Such a movement as this, it is hardly necessary to say, has not developed suddenly or spontaneously. For nearly thirty years, with a self-sacrifice few can estimate, Dr. F. J. Poynton has expounded the disease to the profession and has pressed the claims of the rheumatic child upon the community, and the present forward movement against juvenile rheumatism is the fruit of these many years of pioneer effort. It is a pleasure to be able to add that, in appreciation of this work, the British Medical Association has awarded Dr. Poynton the first Dawson Williams prize in paediatrics, and it is a source of great gratification to those of us interested in this subject that he should be so rightly honoured

by his own professional brethren

When juvenile rheumatism is considered, not as a disease of an individual child, but as a great endemic infection of this country, comparatively novel problems face us, and it is the purpose of this article to discuss these, particularly those connected with the large-scale production of the disease. In some particulars there is general agreement, but in many details there are questions awaiting solution.

PROBLEM OF ENVIRONMENT.

It is generally accepted that juvenile rheumatism owes its production on a large scale to faulty environment. This factor is so strong that it is correct to regard rheumatism as an environmental disease. Two facts prove this to be the case. First, that it is a disease of the poor and not of the rich child; and, secondly, that if the children of the rheumatic stratum of society are removed from their own homes and brought up in residential schools (as has been done in many thousands of cases under poor-law administration), they do not develop the disease. The class-incidence of rheumatism is demonstrable in a variety of ways, and in whatever way it is tested it always holds good. The line of cleavage between the rheumatic and the non-rheumatic strata runs at about (or a little above) the social level separating the class which attends the elementary State school from that attending private day-schools. In a secondary school, for instance, like a Polytechnic, which is fed from both private schools and State schools, only about one-third as much rheumatic heart disease is found in those coming from private schools as in the scholarship boys coming from the State schools, and this in spite of the fact that the latter must be to some extent selected boys.¹

It seems clear, therefore, that juvenile rheumatism

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is essentially a disease of the child of poor parents, living in its own home, and attending an elementary school. It is when an attempt is made to analyse the factors at work in such a régime that difficulties arise.

Urban factor.—Clinical experience and school statistics both seem to point to the fact that rheumatism is more frequent in the children of towns, particularly of industrial towns, than in those of country areas. While this is almost certainly true it must be allowed that up to the present we have very little accurate information from the rural areas. This is now being collected in the western counties by an organized scheme inspired by Dr. Carey Coombs. Taken as true, the significance of this fact is not very clear, but it seems to suggest that the country child, with its superior physique, can overcome the dangers of its home and its school attendance better than the urban child. The risk of dangerous exposure in attending school must be greater in the country than in towns, as the distances traversed must be longer: yet the country child is seemingly less harmed.

Heredity.—Since the enormous importance of the environmental factor in the production of juvenile rheumatism has come to be recognized, less stress has been laid than formerly on inherited and familial predispositions. Clearly, where environment is of great moment, the disease will necessarily show familial characteristics. Again, so many conditions pass by the name of rheumatism that it is difficult to obtain really satisfactory family histories, particularly in the case of uneducated patients: and where these difficulties have been overcome as far as possible, the family incidence of the disease does not work out at a very high figure, not higher than the environmental influence would serve to explain. Some authorities, however, still hold that the "rheumatic diathesis" is

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a very real thing, but it is difficult to conceive this as of great practical importance when the experience of the poor-law residential schools, mentioned above, is kept in mind

Social status—Although nothing is more clearly proved than that rheumatism is a disease of the poor child and not of the rich, it is a very difficult matter to estimate the exact factors in poverty which turn the scale against the child of poor parents. This question is of great importance and has been debated with vigour, and as yet no conclusion has been arrived at. The point of issue is this: is juvenile rheumatism an expression (as it were) of all the varied attributes of poverty, or is there some particular attribute which is of chief importance and outweighs the others? If the disease is the result of poverty as a whole, then we should expect to find it getting more and more frequent as we descend the social scale, and being at its maximum frequency in the worst slums, where underfeeding, overcrowding, dirt and squalor generally are at their worst. Dr A. P. Thomson, I think, was the first to point out that this did not hold good. As a result of most careful investigations in Birmingham, he concluded that rheumatism was a disease of the upper poor rather than of the very poorest. Most inquiries directed from children's hospitals have confirmed this, as did the British Medical Association reports (1926² and 1927³) and the Medical Research Council report⁴ (1927). In these investigations, overcrowding notably has been conspicuous by its absence, and this is surely a valid test of the point at issue. Since then, however, some of those engaged in public health work have disagreed with this view, and have stated that juvenile rheumatism is strictly a "poverty disease," and that conclusions drawn from hospital experience are inaccurate since the very poorest do not attend hospitals. On this point a good deal hangs,

and there is at present no sign of agreement over the matter.

Damp houses.—There is no doubt that juvenile rheumatism is a disease of the poor, but if it is not essentially a poverty disease, if its frequency does not necessarily increase directly as the degree of poverty increases, then possibly there is some special cause at work which determines the distribution of the disease amongst the poor. Personally, I particularly at work which determines the distribution of the disease amongst the poor. The term "rheumatism" is now being there is, and that it is the traditional factory areas, to cold damp. The term "rheumatism" is now being invented for nothing, and it certainly is not a disease of hot dry climates, and there is now being all that any doctor having a rheumatized scheme own would do all he could to prevent as true, the damp house. The distribution of juvenile, but it seems shows it to be a disease which occurs with its superior parts and in proximity to rivers of its home and facts which support the view that the urban child damp is a very real one. If this attending school if course find more of the disease in towns, as the than in a dry one, but we shall also find yet the country upper poor are heavily infected. The importance of the in damp houses and damp distribution of juvenile etly corresponds to hospital experience, less stress. Now it is precisely the housing of the poor that is such a difficult problem. Aited and famihal made about slums, but everyone knows that nearly show famihal all always be slums for the reason that nearly show famihal poor who will make a slum of where conditions pass by the better class poor, who earn good wages, find it difficult to obtain big rents, what are they going to get, particularly in the rents they pay? It is for them that and where these vernment or council houses" have far as possible, the e have, as Dr. A. P. Thomson has not work out at n the country like a rash, they have the environment d sible and, not unnaturally, tend to. Some authorities. "climatic diseases" is

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worst sites It is in the erection of such houses for this class that special care is necessary, and that the present position is highly unsatisfactory is shown in the "Report on Damp Houses" published by the Royal Institute of British Architects last year⁵

12-

child a.

PROBLEM OF CONTAGION

to estimate years there have been occasional efforts the scale as for the large-scale production of juvenile question is of by the theory of case-to-case infection. with vigour, an Research Council's report was specially at The point, this point, and in this year's Milroy an expression J. A. Glover⁶ has attempted to prove of poverty, or incidence of acute rheumatism (not- is of chief importance its low infectivity) is the incidence the disease is infectious disease conveyed by droplet should expect to. Glover, I feel sure, is too familiar as we descend to his researches to imagine that anyone frequency in their views on the evidence he brought overcrowding, carefully compiled and well marshalled worst Dr A the facts he published were capable of point out that facts, and were, at the most, the merest most careful evidence in favour of contagion.

that rheumatism is not an altogether simple one for two rather than the first place, where environment plays directed part in the causation of a disease, many this, as did about its distribution will be consistent (1926² and) of contagion. This is what the Medical report¹ (192) council report found (as was, of course, notably has no conclusive evidence of contagion was this is surely Secondly, certain infectious diseases will then, however up acute rheumatism, so giving rise to work have epidemics of it. Scarletina is the best that juvenile this An outbreak of scarlatina in a disease," and will be followed by a certain number of experience arumatism. every rheumatic child who attend hospital will almost certainly suffer from

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a recrudescence of its rheumatism. But this is not to say that rheumatism is infectious. More difficulty arises in connection with epidemics of sore throats and colds. These will, in certain subjects, set up rheumatism although the infecting catarrh is not rheumatic. Such occurrences, therefore, afford no evidence that the rheumatism itself is spread from case to case.

In this matter we shall do well to rest our practice on well-authenticated tradition. To my prejudiced mind it is sufficient that clinicians have studied juvenile rheumatism in its every phase for years and no tradition of its spread by contagion has been evolved. I think it impossible that we should not know it, were it a contagious disease in any real sense. Again, the theory of contagion would upset all the modern conception of the bacteriology of the disease, for there is no evidence that there is a special rheumatic streptococcus to be conveyed from one case to another.

PROBLEM OF BACTERIOLOGY.

It is now some thirty years since Poynton and Paine enunciated their theory that acute rheumatism was the result of streptococcal infection. One thing is abundantly clear at the present time, and that is that either rheumatism is due to a streptococcus or we have no idea of its causative micro-organism. This is universally admitted, but we may go a good deal further than this. Not only is the streptococcal theory without a rival, although it has outlived many, but it is fair to say that there is no one specially studying juvenile rheumatism in this country to-day who does not accept this view. This is not to say that such have the right to pronounce on a complicated bacteriological problem, but it does at least show that there is sufficient evidence in its favour to be accept-

able as a working hypothesis

Still there are many difficulties, and many points that need elucidation. At one time it was thought that the streptococcus found in rheumatism was a special micro-organism, specifically causative of this disease. Now it looks as if, although there are many streptococci which cannot produce rheumatism, there is probably a whole group of them that can. More important still is the conception that the causative streptococcus is not borne in on the patient from outside, but is a constant inhabitant of the patient's digestive tract, and usually harmless. If this is so, what is it that causes a harmless saprophyte to undertake a new rôle as a disease-producer, what Dr. Coombs has called its "parvenu pathogenicity"? It is here that the prettiest questions of the moment arise. We have tended to think that in some way the virulence of the streptococcus has become exalted in the body, that, for instance, the streptococcus emerging from the tonsil into the blood-stream in rheumatic conditions is in a very different state from that in which it had been lying latent in the tonsillar crypts. On the other hand, with the recent study of the problems of allergy, another conception comes to mind. namely, that the alteration is not so much in the condition of the streptococcus as in the "soil," the patient who has become hypersensitive to that particular streptococcus or group of streptococci. This subject has been recently discussed by Dr. R. A. MacDonald⁷ in a very interesting and suggestive paper, and it does not seem unlikely that these two factors, the alteration in the "seed" and the alteration in the "soil," will be proved to play into each other's hands and so be partners in the crime of producing juvenile rheumatism. Such ideas open up many difficult but fascinating questions. For some years it has been clear that the problem of the bacteriological cause of

rheumatism would not be solved along the old well-worn paths, that some new aspect of infective processes, some novel consideration touching upon the whole question of infection, would be needed before all the facts at our disposal could be made to fit into one complete whole, and it may be that such fresh considerations as have been mentioned here, will prove to be those for which we have been looking.

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- ⁴ *Medical Research Council Special Reports*, 1927, No. 114
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Chorea and its Treatment.

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CHOREA is mainly a disease of childhood and is much more common in girls than boys. It is rare under the age of five years. In a series of 600 cases collected by the writer,¹ three females were affected to one male, and the age of greatest liability was ten years. As in the case of rheumatic fever, chorea is much commoner in urban than in rural districts, and in the lower than in the upper classes. In this country, it is most common in the first three months of the year. In the 600 cases, there was recurrence of chorea in 34·5 per cent., and there was evidence to show that recurrence occurs more frequently after mild than severe attacks. The heart was affected in 37 per cent. of the cases. The greater liability of girls as compared with boys is probably due to the more delicately balanced and sensitive nervous system. Choreic patients are usually the quick, bright, intelligent children, not the dunces. It is interesting in this connection to mention the rarity of chorea in the coloured races. Osler² drew attention to the fact that chorea is practically unknown among the coloured population of the United States, although rheumatic fever is at least as common among negroes as among white people. The difference in temperament and mentality of the two races probably accounts for this.

CLINICAL TYPES.

Three chief types may be distinguished —

- (1) *That with the characteristic choreiform movements*
—The movements cease during sleep, but are present

when the child is awake. They are increased under observation or during excitement. They are often more marked on one side of the body than the other, or they may be entirely confined to one side (hemichorea). The respiratory and laryngeal muscles may be involved, so that respiration is irregular and grunting, and speech low-pitched. Speech is often spasmodic and jerky owing to the inco-ordination of the tongue and lips and the irregularity of respiration. Swallowing may be a matter of great difficulty. The reflexes vary—they are often increased. The knee jerks may be “hung up” or sustained. Sensation is rarely affected, though Trousseau mentioned formication and tingling as of frequent occurrence. The temperature is usually normal, unless some rheumatic complication is present, such as arthritis, tonsillitis, pericarditis. The average duration is from six to ten weeks.

(2) *Paretic or paralytic form*—Loss of power to some extent is common in many cases of chorea. By the *paretic* form is meant that type in which loss of muscular power is the predominant feature. The paralysis is more commonly unilateral than bilateral and may be mistaken for hemiplegia, due to some grave cerebral lesion. Sooner or later, slight choreiform movements develop and increase in severity. Loss of power of speech is commoner in this type than in the ordinary form of chorea, and the child may be quite unable to utter a word. This is sometimes known as “dumb chorea,” and it is often associated with facial immobility, due to weakness of the facial muscles.

(3) *Chorea gravis or insaniens*—This very dangerous form is fortunately rare, especially in children. It occurs mostly in girls at puberty, or between 15 and 20, and in pregnant women. Wandering delirium is present which may become wildly maniacal, and this is accompanied by violent and uncontrollable choreiform movements. Not uncommonly, hyperpyrexia occurs,

CHOREA AND ITS TREATMENT

and may be a terminal event. The condition is often fatal, death resulting from exhaustion

PATHOLOGY

It is now generally accepted that chorea is a rheumatic manifestation, or that it and rheumatic fever have a common cause. Space will not permit a discussion of the many and various views which have been advanced as to the pathology of chorea. The pathology of rheumatic fever is still obscure in some respects, but it would seem likely that it is due at least in part as shown by Poynton, Paine, and others, to some infective agent, probably a diplococcus or streptococcus, and that chorea is caused by the organism or its toxin acting on the brain. The post-mortem changes in the central nervous system are in favour of the view that the manifestations of chorea are due to a meningo-encephalitis, caused by the infective agent or its toxin. Microscopically, the brain shows minute foci of cellular exudate, and also evidence of thrombosis with small areas of softening. The vessels in the pia mater are engorged, and small sub-pial hæmorrhages are present.

TREATMENT.

The main objects we should have in view in treating a case of chorea are as follows —

- (1) To promote rest of mind and body and to secure an adequate amount of sleep.
- (2) To prevent injury due to the choreic movements.
- (3) To maintain the general nutrition.
- (4) To bring about a reduction or a cessation of the movements which, if violent, may cause grave exhaustion.

(5) To reduce as far as possible the risk of cardiac complications or the extension of any pre-existing

cardiac disorder.

(6) To aid the re-establishment of muscular co-ordination.

(7) To remove any source of irritation which may have an influence on the course of the disease.

The child should be put to bed in a quiet, well-ventilated room or, if in a hospital ward, in a bed where there is the least liability to disturbance. Opinions differ as to the advisability of placing screens round the bed in order to isolate the patient from possible exciting influences. This is a common practice in hospitals, but the objection has been urged against it that shutting the child off by screens has a depressing and sometimes a terrifying effect. The writer holds that severe cases of chorea should be isolated by screens, but that in mild cases the screens may be removed in a few days as the patient settles down and becomes accustomed to his surroundings. Isolation for longer than is necessary has a depressing effect on the child, and the removal of the screens may be followed by a marked improvement resulting from the more cheerful surroundings.

If the movements are violent, padded side pieces should be fitted to the bed to prevent the child from rolling out or, if these are impracticable, he may be rolled up in a blanket. Great care must be taken to prevent bed sores and abrasions, caused by the constant and often violent movements of the body and limbs. The joints, such as the elbows and knees, may have to be protected by woollen pads.

The rest in bed should be as complete as possible. In a case treated at home, the child should be left entirely to the care of the mother and a specially trained tactful nurse. The surroundings should be bright and cheerful, though any exciting influences, such as visitors, should be excluded. Complete rest may not only help to shorten the duration and lessen

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the severity of the chorea, but also may have an important influence on the cardiac condition. As soon as treatment is begun, the state of the heart should be examined; the position of the apex beat and the size of the cardiac dulness mapped out, the quality of the heart-sounds and the presence or absence of murmurs noted. A record of the temperature and of the pulse-rate should be kept.

The diet should be ample and nourishing, but easily digested, its nature dependent on the age of the child and his capacity for masticating and swallowing it. In a severe case of chorea there may be considerable difficulty in getting the child to take sufficient nourishment, owing to involvement of the muscles of mastication and deglutition. In such cases the food should be liquid, or thickened by the addition of one of the invalid foods, and given from a feeding-cup or baby's bottle. An adequate supply of nourishment is of great importance, as the loss of weight in a protracted or severe case is often very marked. Feeding by nasal tube may have to be resorted to if other methods fail.

The bowels should be carefully regulated as there is usually a tendency to constipation. The ordinary simple aperients, such as infusion of senna or syrup of figs, generally suffice.

Salicylates do not appear to have any action in shortening or modifying the course of an attack of chorea, even when given in large doses. If, however, a choreic child has a slight pyrexia, or tonsillitis, or pain in the joints or limbs, sodium salicylate or aspirin should be administered until these symptoms have disappeared. The majority of cases, however, are afebrile, and for these a vast number of drugs have had their advocates and their day. The duration of chorea is usually from six to eight weeks, but it cannot be said with confidence that there is any one of the old remedies which can be relied on to shorten this period.

Arsenic, in the form of the liquor, has had perhaps the longest vogue, but in the writer's opinion, it is of little use during the early weeks, though given in the later stages when the movements are definitely subsiding, it does seem to hasten recovery. It is probable that this is due to the tonic effect of arsenic rather than to any specific action of the drug. Administration of arsenic by intramuscular or intravenous injection does not appear to have any advantage over the oral route, and has obvious disadvantages. When the movements are violent and persistent, thus preventing the child from resting, some form of sedative is indicated, such as chlorotone, chloral, trional, and luminal. These drugs do not cure the disease, but may cause a cessation of the movements by bringing about a drowsy condition and promoting rest. Bromides generally prove to be quite efficacious.

Chlorotone, introduced by W. E. Wynter³ in 1908, is best given in gelatine capsules. If the child cannot swallow the capsule, the powder can be extracted therefrom and given in water. Solutions of the drug should be freshly prepared, as it readily decomposes. For a child of ten, 5-gram doses of chlorotone may be given night and morning. If this produces no effect, a third dose may be given mid-day. The action of chlorotone is to produce a torpid or sleepy condition often accompanied by slight pallor and a marked diminution of the movements. When this occurs, the dose may be reduced or discontinued for a time. Chlorotone should not be given for a lengthy period as it has a cumulative effect and may have a depressant action on the heart.

Chloral, in 5-gram doses, three daily, is also useful in severe cases with excitement, provided there are no serious cardiac complications.

Trional, in 8- to 10-gram doses, three daily, sometimes is efficacious when chlorotone and chloral have

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failed

Luminal, in $\frac{1}{2}$ -grain doses, twice daily, and *phenazonum*, in 5-grain doses, thrice daily, are also useful.

These, or drugs of this class, may have to be resorted to in cases which exhibit severe mental disturbances or violent, uncontrollable movements. The very grave form known as chorea gravis or insaniens, calls for immediate treatment with some form of sedative, such as has been mentioned.

Magnesium sulphate has been recently employed with some success in the treatment of chorea. It will be remembered that dilute solutions injected endotheically in cases of tetanus greatly reduce the frequency and severity of the spasms. Marinesco⁴ recommends 0.008 mg. per kilo of body weight in a freshly-saturated (25 per cent.) solution. This is slowly injected into the spinal canal and the injection repeated every five to six days. The present writer has no personal experience of this treatment of chorea, but he considers that it may prove useful in the most severe type of the disease.

Nirvanol: special mention must be made of the recently introduced treatment by this drug. It belongs to the barbituric acid group, and is therefore closely allied to luminal. It was introduced in this country by Poynton and Schlesinger⁵ in 1929, though it had been employed for some years previously on the Continent. Nirvanol appears to have a definite influence in shortening the duration of the attack of chorea, but its administration is attended by certain drawbacks. After the drug has been given for seven to eight days, a short period of drowsiness lasting 24 to 48 hours may set in and an erythematous rash of morbilliform character may appear, which is often accompanied by fever. The rash may be very extensive or it may be limited to the hands, knees, and elbows. It lasts usually from three to four days. The

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temperature, which may be as high as 101-102°, falls with the disappearance of the rash. The choreic movements begin to diminish rapidly a week later. During the reaction period the blood shows a definite eosinophilia. The dose recommended for a child of ten is 3½ grains, given once a day, and this should be discontinued as soon as the reaction sets in. Nirvanol is a remedy which may be safely employed only in the wards of a hospital or in a private house where the patient is under close supervision, and it should not be prescribed under other conditions. For further details as to treatment with nirvanol, reference may be made to papers by Ashby⁶ and Whitaker.⁷

A mild case of chorea kept at rest and free from excitement will usually recover in six to eight weeks without the aid of drugs, but a longer period may elapse before all jerkiness or unsteadiness of movement has disappeared. Co-ordination has been disturbed and its re-establishment may take some time after recovery from the chorea. In some cases, it would seem as if a "chorea habit" had been set up. Exercises can do much to correct this and to hasten recovery and, if suitably chosen, may provide interesting occupation for the child. Jigsaw puzzles, coarse knitting or needlework, and toys which require more or less delicate movements of the hands and fingers are most useful and may be provided as soon as the child is able to undertake them. Massage is also indicated at this stage.

The question will arise as to how soon the child may be allowed out of bed. If the heart is not affected and the pulse-rate is not markedly increased when the child sits up in bed, he might be allowed to lie on a sofa and later sit on a chair for a short time, even before the movements have entirely disappeared. The change usually has a beneficial result and may hasten recovery. As recovery advances, toys are

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useful and, of these, arsenic is one of the most effective.

In some cases, there may be found a focus of infection or other cause of reflex irritation which has an influence on the course of the chorea or which, if not dealt with, may lead to a prolongation of the condition or to an increased liability to relapse. Intestinal worms, dental abscess, septic tonsils, etc., may be given as examples. The result of treatment of these is sometimes striking. Children who have suffered from chorea should be carefully guarded from over-pressure at school. Naturally quick and bright they are liable to be pushed, sometimes unduly, in their school work, and it is not uncommon to find an attack brought on by the stress of an examination.

We may say in conclusion that rest, quiet and freedom from all excitement are the most important measures in the treatment of chorea, not only in shortening the duration of the attack but also in lessening the risk of cardiac involvement and the liability to relapse and recurrence.

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Amaurosis in Infants.

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SIGHT is a function which is not fully developed at birth and, in fact, there is considerable evidence to show that vision in its completeness is not firmly established until near the end of the first decade of life. Within a day or two after birth an infant should fix a light when directed towards its eyes. This fixation of the light will not be maintained for any length of time: it is only momentary. It should, however, normally be present, though at times it may be difficult for the observer to demonstrate it satisfactorily if the infant is sleepy or crying. At about the fourth week of life the power of maintaining fixation should be established—the infant will definitely watch and follow a light with its eyes. From now on the progress of vision development is steady and uneventful in the normal child. The conception of objects is assisted by the sense of touch, and as the infant's power of mobility increases, so does the range and field of its vision.

Gross congenital abnormalities of the eyes will, of course, be obvious to everyone from the first, but, excluding such obvious causes of defective sight, it is towards the end of the first month of life that the watchful mother will begin to suspect that the infant's sight is not as it should be, and will seek advice.

In such cases, before a definite opinion can be given, a very thorough examination is necessary. First, the infant's power of fixation and of maintaining fixation must be estimated. This is effected by flashing a light into the infant's eyes, observing if the light is fixed, and then by moving the light if it is followed. It is best to do this in a darkened room, and it is important

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that no sound should be made when the light is flashed on and off, as this might confuse the issue—the infant fixing the sound. Next the eyes must be examined for any abnormality in structure or reaction, and in order to view the fundus oculi the pupils need to be dilated with a mydriatic, and in most cases an anæsthetic also is needed

In addition to those cases in which sight appears to be late in developing—and these are the cases which, as mentioned above, are brought to the doctor usually about the end of the fourth week—there are a certain number of cases in which sight, after developing normally for the first few weeks or even months, then begins to fail

As regards possible causes of amaurosis in infants, it will be found that these can be brought into two main groups: (1) In which the eye itself is affected; (2) in which the eye is quite normal and the defect lies in the brain.

Taking group (1) into consideration first, it is not proposed to include in this group gross lesion of the eye, in the congenital or acquired sense, such as microphthalmus or corneal scars. These lesions are obvious to naked eye examination. It is rather those conditions which are only revealed by detailed examination. Further, a certain amount of latitude must be claimed for the label "Amaurosis." In some cases the development of sight is only delayed, and in some, though present, is not up to the average standard of acuteness. In the latter cases, the light fixation reflex can be obtained, but requires a strong stimulus—a very bright light—and the complete absence of any competing distractions—sound, surrounding light, hunger, or sleepiness

Under these conditions the commonest cause of delayed sight development is albinism. Albinism is a term denoting deficiency of pigmentation. It may

be widespread, or confined to one organ of the body. It is frequently confined to the eye alone, and often to the retina and choroid solely. Naturally, all grades are met with. But whereas the complete albinism strikes the eye at once, the case where there is a relative pigment deficiency of the retina and choroid is only found by means of ophthalmoscopic examination, and it is a matter of experience to decide whether the deficiency of pigment is beyond normal limits, particularly as considerable increase in pigmentation may normally be expected to take place in the eye during the first six months of life. Yet it can safely be said that albinism is the cause of a large percentage of the cases of delayed fixation development in infants.

Prognosis is, on the whole, good. As stated, the process of pigmentation goes on during the first six months of life, and in the majority of cases fixation development is only delayed. It may be of interest to quote a typical case briefly.—

A female infant, aged 3 months, was brought to hospital because she could not see. Eyes, on examination, were apparently quite normal, except for marked pigment deficiency of the retina and choroid. The infant would momentarily fix a bright light, but did not maintain fixation or follow the light. At 6 months of age, noted "that she now plays with paper." At 9 months, noted "eyes parallel, slight horizontal nystagmus. Notices things only slightly, occasionally closes eyes when face is threatened with elbow." At 1 year. On the whole notices things better. Nystagmus still present, looks at the mirror of the ophthalmoscope. At 18 months. Nystagmus almost ceased, sees much better, picked up a halfpenny from the floor. Mother says the child is not backward. The mother says that she noticed that the sight began to develop from the seventh month.

Of other cases which are relatively common, cataract and choroido-retinitis should be mentioned. Both these lesions will not be obvious except by ophthalmoscopic examination. Certain forms of congenital cataract can be seen by the naked eye with foetal illumination, but if the opacity is situated centrally, or in the posterior layers of the lens, it can only be seen

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with the ophthalmoscope. There are, of course, all grades of cataract, and the delay of sight development will be in proportion to the density of the lens opacity. Light fixation is nearly always present, but the maintenance of fixation is delayed. "Eye-rubbing" is characteristic of an anterior ocular opacity. The infant wants to use its retina, and tries to get the sensation of sight stimulated by alternately covering and uncovering its eyes with its hands, or by moving its hands in front of its eyes.

An anterior capsular cataract is readily seen by the naked eye as a small white spot situated in the pupil. These cataracts do not affect the sight development to any extent. The parents bring such children up for advice as to the nature of the white spot and not because the child cannot see normally. Choroidoretinitis is practically always due to syphilis.

Turning now to group (2), here the eye itself is found to be perfectly normal, and the fault lies in the cortex, or in the connections between the eye and the cortex. Most of the cases in this group can be placed under the classification "mental deficiency." One of the earliest signs of mental deficiency is the absence or delay of the function of sight, later other associated signs will appear, such as delay in holding up the head, and in sitting up, and delay in the development of speech, etc. Out of the 60 cases of infants examined on account of defective or absent sight, 19 were found to belong to this category. In every case the eyes themselves were quite normal, and the pupil reflex to light was obtained. In most of these cases a certain amount of sight developed eventually. Two cases may be quoted briefly as examples —

Case 1 — A male infant, first seen in 1913. His mother thought that he was blind. Infant does not fix the light. Roaming nystagmus, pupils react to light, fundi normal. 1915, now 2½ years old, does not talk or walk, does not recognize people. 1920, noted "he has been an inmate of the Temporary Fountain Mental Hospital

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for the past four years.

Case 2.—Female infant, first seen when aged 8 months. Mother thinks that she does not notice things. Eyes normal, no nystagmus. Noted at 1 year: "Child not like other children of same age; definitely backward, cannot sit up, no teeth yet, does not crawl." Noted at 18 months: "Will fix and follow lights, but seems slow in making up her mind to do so, and has not sat up or crawled yet."

There is another group of cases to which the name "temporary amaurosis" has been applied. In these cases an infant, whose sight has apparently been developing satisfactorily, quite rapidly becomes blind. In a typical case this blindness will last a few weeks, after which the sight will return. There is usually a history of some general disturbance, such as fits, occurring just before the onset of the blindness. In some cases with a similar onset no recovery of sight occurs. In these cases atrophy of the nerve eventually appears, whereas in the "temporary" cases no fundus abnormality is seen at the time, nor does atrophy develop. It has been suggested that the pathological basis of these cases is a basal meningitis, and that duration and intensity of the meningitis will determine as to whether the amaurosis is temporary or permanent.

In conclusion, mention should be made of the condition "amaurotic family idiocy." In this disease there is a general progressive degeneration of all nervous tissue, in which the nervous elements of the eye share. Loss of vision is often the first symptom which calls attention to the condition, and the very characteristic ophthalmoscope appearance of the fundus clinches the diagnosis. A cherry-red spot is seen at the macula, surrounded by an area of white cloudiness due to necrosis of the retinal elements. This disease occurs in the first two years of life, and is invariably fatal. It is almost exclusively confined to the Jewish race, though a few cases in Gentiles have been reported.

Injuries of the Elbow in Children.

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THERE are many reasons for the uneasiness displayed by most practitioners when called to deal with injuries about the elbow joint in children. There is often a very real difficulty in making a diagnosis, for in the very young bony prominences are only suggested—not felt—especially when the elbow is swollen, and even an X-ray in the absence of experienced interpretation often misleads. When complications, such as injury to nerves, and sequelæ, such as ischæmic palsy and myositis traumatica are known to occur it is next to impossible to predict with certainty a result likely to afford the parent satisfaction. Unhappily injuries to the elbow are very common, and in nearly all cases have to be dealt with in the first instance by the local doctor. So much depends upon doing the right thing without any delay, for after a few days a good result is seriously jeopardized. This short article is intended to help the practitioner and may therefore appear to be dogmatic and elementary.

Injuries about the elbow may involve the bones or the soft tissues, or both, and considerable swelling may occur with either. It is usual to have less swelling in the absence of fracture or dislocation, although a fixed rule cannot be made. An X-ray should be procured despite any trouble involved if movements are not free, even though there may be but little swelling. It is a protective measure affecting both

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the patient and the doctor. If delay is inevitable the elbow should be temporarily treated, but the parents should be warned of dangers that may be encountered. It is a great mistake in this early stage to be too optimistic. The hand should be examined to make sure that all the movements are present, otherwise a paralysis may be ascribed to treatment. Let us remember that the most common fracture is the supracondylar, with or without lateral displacement. Under no circumstances should there be delay by fomenting or applying other measures to reduce the swelling. A careful examination of the elbow should be made. In the presence of swelling even an expert may be inaccurate in his diagnosis.

Points to help diagnosis.—Normally there is no lateral movement of the elbow. If lateral movement is present it denotes a gross lesion. This lateral movement may not be at the joint but just above it, and is usually due to a supracondylar fracture. If adduction can be produced most easily at the elbow joint it is usually due to fracture of the internal condyle; if abduction mainly, it may be the external condyle. In epicondylar fractures this lateral movement is not present as the fracture does not enter the joint. If bony points can be felt a fact of great practical importance for diagnostic purposes is that, if the arm be extended and normal, a line drawn from one epicondyle to the other passes over the tip of the olecranon. If the elbow be flexed to a right angle the olecranon lies a little more than one inch below, and not quite half way between the condyles, being a little nearer to the internal. Of the ligaments the internal is of most importance. It limits both flexion and extension and resists lateral yielding.

I will not dwell at any length with sprains of the muscles around the elbow, but will refer only to a severe sprain of the joint. As a rule it is not difficult

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to diagnose. The joint is swollen and tender and carried at an angle of about 55° . There is a fullness at each side of the olecranon and easy gliding movement in the joint within its limited range. There is usually great pain on voluntary movement, and on passive movement over the lateral ligaments. There may be lateral movement due to rupture of the ligaments. The condyles, epiphysis, head of radius and olecranon are in their proper relationship and firm. The only treatment needed in this injury is that the arm should be flexed in a sling in a position a little below a right angle.

Recent dislocations will receive a passing notice. They are usually easily diagnosed and reduced. The bony points for guidance here are the condyles, the head of the radius and the olecranon. In backward displacement of the forearm there is a fullness at the bend of the elbow. The joint is usually carried at an angle of 140° degrees. The head of the radius is very superficial to the outer side of the olecranon and behind the external condyle. The forearm is shortened anteriorly. In the upper part there is deviation of the axis of the arm, limited flexion and extension, and a varying degree of lateral movement. The dislocation is due to a fall on the hand and the elbow is thereby hyperextended and usually abducted. There are often complications—the most common being fractures of the olecranon or coronoid, of the tip of the internal condyle or of the head of the radius.

Other types of dislocation occasionally occur. They consist of a lateral displacement in either direction, which is rare, and a dislocation upwards and outwards of the radius. This latter displacement is apt to become recurrent, and is often free from symptoms unless it blocks the way to full extension. I shall refer to treatment later.

A very common displacement which occurs in



Fig 1 — Traumatic dislocation of the elbow without fracture



Fig 2 — Dislocation of

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FIG 3.—6 weeks later, showing large mass of new bone formation in front of and behind the humerus. Bone soft in character and rapidly growing.



FIG 4.—2 months later after being treated by complete rest in a sling. New bone formation largely absorbed, small amount left which is now clearly defined and definite in appearance.

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children is a subluxation of the head of the radius. It is due to forcible traction on the hand or wrist of a young child. The head of the bone becomes fully or partially displaced owing to a stretching of the capsule and orbicular ligament. The arm hangs by the side in pronation and any attempt at moving the elbow is painful. Reduction is always easy and is effected by flexion and supinating the arm and keeping it at rest for two or three days. The reduction is always accompanied by a click.

For convenience I will group fractures around the elbow joint under three headings: (a) Fractures of the external condyle, (b) Fractures of the internal condyle, (c) Supracondylar fractures.

Fracture through the External Condyle—This is not very common. The line of fracture varies but runs obliquely into the joint and frequently carries the capitellum with it. It is usually due to a fall on the hand, but it may result from a direct blow while the elbow is flexed. The displacement is forwards, and owing to initial displacement and the direct pull of the extensor group the fragment may turn turtle. If left alone the deformity increases and the fragment found on the antero-external side of the elbow under tightly stretched skin. Unless reduction is effected cubitus valgus deformity of a marked type may result, and many years later ulnar nerve involvement may occur owing to the stretching of the nerve by the abnormally prominent internal condyle. The swelling is mainly on the outer side of the elbow, crepitus, mobility and impaired flexion are present. The relationship of the three points of bone are altered, the antero-posterior diameter on the injured side being increased. Non-union sometimes follows. The treatment will be suggested later.

2 *Fracture of the Internal Condyle*—This occurs in several ways. In children it is often impossible to

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obtain a history In the adult it is usually due to a fall on the point of the elbow. It is not a very common injury in children, who usually fall on the outstretched hand Crepitus is generally obtained by moving the fragment anteroposteriorly. The fracture is often found entering the joint to the outer side of the inner tip of the trochlea. The fragment is displaced upwards, and may be rotated It is sometimes accompanied by ulnar paralysis which should be discovered before treatment is started. The olecranon maintains its relationship to the internal condyle; the interference with the normal position of the three bony points is, therefore, not great. If there is displacement upwards the carrying angle will be diminished This fracture is perhaps the most disabling of all, and this is mainly due to the fact that the ulna must be regarded as the anatomical continuation of the humerus We must remember that fracture of the olecranon is rare in children who do not often fall on the point of the elbow, and if they do the olecranon usually acts as a wedge, causing cleavage of a condyle In the adult the olecranon, being brittle, fractures first Fracture of the head of the radius is rare in childhood Having now briefly described the displacements accompanying fractures involving the condyles and dislocations at the elbow we will deal with the common fracture, known as supracondylar Under this term will be grouped all transverse fractures of the lower end of the humerus, be they above or through the epiphysis The so-called intracondylar or T-shaped fracture is so rare in children as to be negligible

Supracondylar Fracture —This, in my experience, is much the most common fracture about the elbow in children When it is met with in the adult, with whom this article does not deal, it is generally the result of direct violence, such as a crush, and is often compound If an adult falls on his hand the ligaments

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FIG 7—Showing reduction of lower fragment by extension, pulling lower fragment round lower end of upper fragment before acute flexion is accomplished.



FIG. 8—Showing end result

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usually give, and a dislocation occurs. The reverse is the case in a child. We know how difficult it is to obtain a true story of the mechanism of this fracture in children. We know it is easily produced upon the cadaver by hyperextension, and we have ample evidence that it may be produced in life by a fall upon the hand. This will account for the upward and backwards displacement of the lower end of the humerus. The line of fracture is downwards and forwards from behind, and this favours a sliding upwards of the lower fragment. This displacement is directly assisted by the action of the triceps and the flexors of the elbow. I have frequently drawn attention to a fact of great practical importance, and that is the slipping of periosteum from the posterior aspect of the upper fragment, which is liable to throw out a mass of bone if the deformity is not corrected immediately. If this fracture is not reduced the newly formed mass of bone renders a late replacement very difficult, even by operation. This may all happen in a few days.

If I have been able to simplify the diagnosis of these complicated lesions of the elbow I am glad. What should be done, however, by way of treatment, even if we are in considerable doubt as to the precise diagnosis?

TREATMENT.

In 1902 I wrote advising house surgeons and others to treat all these lesions by manipulation, followed by slinging the arm at about 30° of flexion, and to discard all splints. Much as I dislike the term "routine," I know that this method of treatment, if properly applied, yields surprisingly good results. One recognizes in old unsuccessful cases that flexion of the arm is frustrated by bony blocks, such as the prominence of the shaft of the humerus or forwardly displaced condyle, and that only in a flexed position can a right of way be secured. To flex the arm without correcting the

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deformity is, of course, insufficient I will, therefore, state my procedure when dealing with a supracondylar fracture, and it will be seen how little one need modify this manipulation in the case of other fractures or dislocations This should be carried out even in the presence of considerable swelling In the case of an uncomplicated supracondylar fracture without lateral displacement success can be assured.

The surgeon should grasp the child's wrist with the right hand and place the left hand around the upper arm, so that the thumb puts pressure on the lower end of the upper fragment, just above the elbow. The forearm should be extended and pulled in order to disengage the lower fragment When this has been done the forearm should be supinated, and while the pull is maintained the arm should be flexed while the upper fragment of the humerus is pushed back The arm should be flexed to about 30° , or as near 30° as the swelling will allow. May I ask the reader to follow these instructions on a neighbour before proceeding further? When the arm is extended it may be seen that there is a lateral displacement of the lower fragment, either to the right or left In that case see that lateral pressure is applied to correct the displacement during flexion Flexion alone is sufficient to maintain the fragments in position

Supposing the fracture is not supracondylar, what is likely to happen by this manipulation? If the elbow is merely sprained, no position can be better than that of flexion If a dislocation of the radius, supination and flexion restores it If the forearm is dislocated backwards one is applying exactly the technique for its reduction, and if one cannot flex one knows that reduction has not been accomplished. If the fracture is intracondylar, the position of hyperflexion secures at once for the forearm a right of way before exudation and displacement of the condyle, which would

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Supposing the fracture is not supracondylar, what is likely to happen by this manipulation? If the elbow is merely sprained, no position can be better than that of flexion. If a dislocation of the radius, supination and flexion restores it. If the forearm is dislocated backwards one is applying exactly the technique for its reduction, and if one cannot flex one knows that reduction has not been accomplished. If the fracture is intracondylar, the position of hyperflexion secures at once for the forearm a right of way before exudation and displacement of the condyle, which would

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eventually prevent flexion, can occur. If the elbow appears wide because of separation of condyles, it can be moulded.

Flexion is the correct position in all injuries in the region of the elbow excepting fracture of the olecranon—a very rare fracture in childhood. One can be fairly sure—in spite of swelling—if the movements of pronation and supination, flexion and extension can be performed easily that a good result may be expected. If there is any difficulty in these movements after manipulation a close study of the fracture is needed. It is obvious if fractures cannot be correctly placed by manipulation operation may have to be employed. If a supracondylar fracture lies in displacement for a fortnight or three weeks it is often useless to attempt replacement of fragments by manipulation, and an operative attack will be called for.

Full flexion of the elbow has been criticized lately as possibly a cause of ischæmic palsy. I have not seen or heard of one case where flexion with complete replacement of fracture has been responsible for this condition. Flexion without reduction is obviously dangerous, but this is due to inefficient manipulation. If the arm and elbow are greatly swollen it would be wrong acutely to flex the elbow, and it should never be flexed sufficiently to occlude the radial pulse.

I repeat that no splints or bandages are needed, and that reduction is accomplished by maintaining traction on the lower fragments, backward pressure on the upper fragment, and gently bringing the elbow into the position of supination and flexion. The wrist is suspended by a sling with the hand resting below the elbow.

In his interesting work entitled "On Anatomical and Surgical Study of Fractures of the Lower End of the Humerus," Ashurst, referring to the "Jones position," says: "At one time I was sceptical of its

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and the course of the ulnar nerve may be deflected from behind to the front of the elbow.

(2) *Vollmann's ischæmic paralysis* is very alarming and requires immediate attention. It most often follows backward dislocation of forearm and supracondylar fractures in young children. It is due to acute venous obstruction in the antecubital fossa. This may be caused by pressure from within where a large hæmatoma has accumulated under tension, or pressure from an unreduced fracture. It may be due to tight bandaging or splints. Such a condition may be made more serious if in addition to the bony block hyperflexion is maintained. The effects are chiefly seen in the flexor group of muscles which arise from the internal epicondyle, and the upper ends of the radius and ulna. Within a few hours there is a widespread degeneration of muscle fibres, followed by a round cell infiltration. This is accompanied by progressive contraction.

Early symptoms begin in a few hours. The hand is painful; the fingers are discoloured and numb, and voluntary power diminishes; the fingers and wrist become contracted and the muscle bellies in the upper forearm are hard and resistant. The skin may show blebs or sloughs. The deformity is characteristic. The fingers are slightly extended at the metacarpophalangeal joint and flexed at the interphalangeal joint. When the wrist is passively flexed to the fullest extent it is often possible to straighten the fingers. In the slighter forms of the contracture there is usually some power of active flexion of the digits. In severe cases there may be complete loss of function in the fibrotic muscle group. The median and ulnar nerves may be involved in the fibrous mass.

Treatment—Prompt action may entirely prevent or minimize the ill-effects. The arm should be released and rested in elevation. Division of the fascia over

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the antecubital fossa and evacuation of the hæmatoma are essential. It is necessary above all things to act promptly. The surgeon should remember the possibility of this most ghastly complication and act without any delay. When the contractions have developed special treatment must be adopted, which space will not allow me to indicate.²

Prophylaxis.—Avoid circular compression. Reduce dislocations and displaced bones. Avoid all kinds of splints and bandages. Do not use force in flexing the elbow. Critically watch all fractures of the elbow. Feel the radial pulse.

(3) *Myositis Ossificans Traumatica*—This is not a very uncommon complication following fractures and dislocations about the elbow in the adult. In children and adolescents it is rare. It is a direct sequel of the invasion of injured muscles by bone cells, and indicates a loss of continuity in the periosteum. It may start in a few days after injury, but generally not before the third week. The elbow, which has been recovering its range of movement, begins to stiffen. The surgeon usually starts passive movements, which increase the deposit of bone cells and further limits movement.

Treatment—(a) *Preventive.*—All forms of treatment which embody excessive stimulation and local irritation after injury to the elbow favour the development of intramuscular irritation, such as energetic massage and repeated forced movements. The modern routine of rest and flexion for at least 14 days is rarely ever associated with this condition. (b) *Treatment of the bony deposit.* If the joint is rested, the bony deposit will partially or wholly be absorbed. Any movement of the elbow joint is hazardous and favours further outgrowth of bone. Early operation is wrong as recurrence will surely follow. When the growth is mature and will not further disappear by rest its

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removal can be undertaken. It will often be found encysted. It most often invades the brachialis anticus, but may start in any of the muscles.

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Flat Foot in Children.

By R C ELMSLIE, M.S., F.R.C.S

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WHEN a child starts walking he places his feet flat on the ground, widely apart, with the weight chiefly on the inner sides; there is little or no arch to be seen, the toes are spread out, or actually pressed downwards against the ground, and the child walks flat-footed without any spring. As walking improves, the feet are brought more and more together, placed one in front of the other, and the weight is gradually thrown upon the outer border of the foot. This usually takes a few months, and during this time the child learns to rise on the toe as he takes a step, and the longitudinal arch gradually develops.

A delay in the development of the arch is very common, even in children whose feet are perfectly normal. It is particularly liable to occur in children whose feet are originally over-mobile. In some of these the foot can be dorsiflexed so that it touches the front of the leg; such a condition is a mild degree of talipes calcaneo-valgus—in fact it is the ordinary deformity to which this name is given, as a fixed condition of calcaneo-valgus is very rare as a congenital deformity. Cases of talipes calcaneo-valgus certainly form a large part of the more severe cases of flat foot seen in infants.

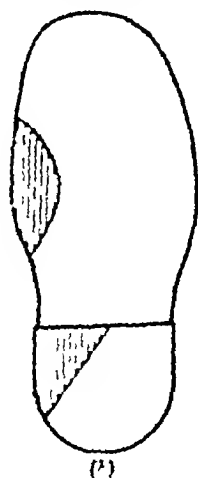
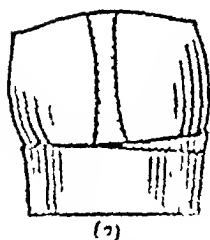
When the hypermobile foot is noticed in a baby, the liability to the development of flat foot can be lessened by keeping the foot splinted in an inverted position during the first year; but the child should be watched when he begins to walk, and the feet supported if necessary.

When a child continues to walk with the feet apart

and the weight on the inner border, there is a tendency for a mild degree of knock-knee to develop, so that the association of knock-knee with flat foot is very common in the first years of life. Such a knock-knee may increase up to the stage in which the malleoli are separated by $1\frac{1}{2}$ to 2 inches when the knees are in contact. If it extends beyond this the condition becomes serious and may require some drastic treatment. Knock-knee of mild degree is, however, very common in flat-footed children, and as a rule requires no treatment beyond that prescribed for the flat foot.

In examining children with flat foot it is desirable to see them walking and standing, both in their shoes and barefoot, to test their power of tiptoeing and the mobility of the feet. X-ray examination does not assist except in the severe cases alluded to later.

In these mild conditions of flat foot the first line of treatment is to adjust the shoe in such a way that the weight is thrown on to the outer border. This is done by inserting a small wedge under the inner side of the heel. It can be easily demonstrated that as soon as



- (1) The correct position for a wedge in a shoe.
 (2) The incorrect position for a wedge in a shoe.
 (3) The correct position for a wedge in a shoe.
 (4) The incorrect position for a wedge in a shoe.

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the child tips over on to the outer border an arch is produced. The wedge is from one-sixth to one-quarter of an inch in thickness; it should be inserted between the shoe and the heel before the latter is put on, and not simply fixed to the outside of the heel. If the latter course is taken, there is always a tendency to throw the foot off the heel on to the outer side of the upper of the shoe. It is sometimes useful to prolong the heel about three-quarters of an inch forwards on the inner side, this helps to support the waist of the shoe and prevent it giving way.

There is no necessity, in small children, to put any wedge on the inner side of the sole of the shoe. If this is done it tends to stiffen the shoe and prevent it bending under the weight of the child, and it is very important that the shoe should be left sufficiently supple to bend in this way. If it is made too stiff the child cannot rise on to the toe in walking, and tends to walk off the inner side of the shoe with the foot everted, or off the outer side with the foot inverted.

In selecting shoes for flat-footed children they should fit accurately, but must not be too short. A flat foot shortens when the arch is supported, and lengthens when it gives way. A new shoe, whilst the leather is stiff, supports the arch; but after it has been worn for a little while the amount of support diminishes, the foot is allowed to lengthen, and the shoe may then prove to be too short. There is little difference between boots and shoes. It is usually thought that a boot supports the ankle better than a shoe, but unless the upper of the boot is very stiff this support is only afforded when the boot is new, and a very stiff boot is not good for the foot.

A flat-footed child, in trying to get the weight on to the outer border of the foot, often tends to turn his toes in; such a position is the strong position for the foot, and should not be corrected unless it becomes

excessive Wedges on the inner side of the shoe and stiffness of the sole of the shoe increase this tendency to intoeing; in fact it is advisable to teach children to turn their toes in rather than out, although it is sometimes necessary to correct them, because if the intoeing is excessive they are inclined to trip over their own toes.

In some cases of rather severe flat foot in children of four or five or over it is not sufficient to put wedges in the heels of the shoes, because the waist of the shoe tends to give way and sag downwards. The inside of the shoe may then be strengthened by the insertion of a stiff leather valgus insole.

Exercises for re-education are an important item in the treatment of flat foot in children. Their object should be: first, to teach a correct standing position with the weight thrown on to the outer border of the foot, but with the big toe joint still on the ground; and, second, to train the power of tiptoeing on each foot separately, thus improving the control of muscles, teaching balance, and strengthening the calf muscles. It is very difficult to teach small children formal exercises, and it is best to try and get simple methods of carrying out these principles of re-education. the child can be made to walk along lines or marks on the floor, with one foot in front of the other; he can be given games in which tiptoeing is essential and he can be made to balance on a narrow piece of wood and to practise walking along it. Skipping and dancing are also useful methods of improving tiptoeing and balancing. With older children formal exercises for placing the feet accurately, for balancing, tiptoeing and walking correctly can be given.

Much depends upon how the exercises are done. If they are carried out mechanically, with the idea that their use is simply to strengthen muscles, they may be used for a year or more without producing

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any improvement. It must be remembered that the object of the exercises is to alter a habit, and that they must therefore be carried out thoughtfully and with concentration. It is always best to get the exercises properly taught by a trained medical gymnast and supervised by her from time to time.

The more severe degrees of flat foot are of greater importance and more difficult to correct. These degrees should be divided into two groups—those in which the foot is very flat and much everted but is quite supple, and those in which there is some rigidity or stiffness. The severe flat foot that is supple requires a more drastic support, and as a rule such a support must be made of metal. The principle upon which it is based is that of forming a bridge across the waist of the shoe so that the weight is thrown on to the heel and on to the tread under the metatarsal heads, thus protecting the waist of the shoe and preventing its giving way beneath the child's weight. As a rule it is best to have a special plate made to a plaster cast of the child's foot taken in the best position and mounted on to a leather insole so that it can be slipped into whatever shoes are being worn. It is quite possible to have a metal plate built in to the waist of each shoe so that no separate support is required, but this necessitates all shoes being made individually—a troublesome and expensive business in the case of children who require renewal of their shoes at frequent intervals. It is sometimes found that such a plate tends to throw the foot so far on to the outer side that it slips off the sole of the shoe and bulges the upper on to the outer side. When this occurs a plate should be made of the Whitman pattern, in which there is a lip around the outer border of the heel just behind the base of the fifth metatarsal, to prevent the foot slipping sideways.

It is desirable in these severe degrees of flat foot to

over-correct the deformity. Parents are sometimes troubled by this because they think that the child is now beginning to walk too far over on the outer side; there is no objection to this so long as it does not cause the shoes to wear out too rapidly.

In some cases of severe flat foot it will be found that the arch is not brought up when the child rises on tip-toe. It is then useless to carry out exercise treatment on the lines already suggested as suitable for the milder conditions. Physical treatment must be by massage and movements and exercises carried out in the sitting position, and a trained masseuse and medical gymnast must be employed.

Sometimes in cases of severe flat foot the tendo Achillis is a little short. As long as the foot is inverted it will not dorsiflex beyond the right angle, but if it is allowed to fall into a position of eversion it can dorsiflex further. This short tendo Achillis is undoubtedly a factor in keeping up the flat-foot deformity, and it must be corrected. Some surgeons advocate lengthening of the tendon in these cases, but this operation undoubtedly weakens the calf muscle and should be avoided if possible. In children up to the age of ten or twelve it is almost always possible for a good masseuse to stretch the tendo Achillis by passive force and by exercises. A determined attempt to stretch the tendon in this way should be made, and whilst it is being carried on the strain upon the tendon can be relaxed by making the heel $\frac{1}{2}$ in. higher than normal.

Painful flat foot in children is rare. It most often comes on at the age of fourteen or after, when work has been started and an additional strain is thrown upon the foot. Pain is most often associated with stiffness; the foot will not invert freely, and the arch cannot be properly reconstructed. In every such case an X-ray examination should be made.

Rigid flat foot coming on in a young child always

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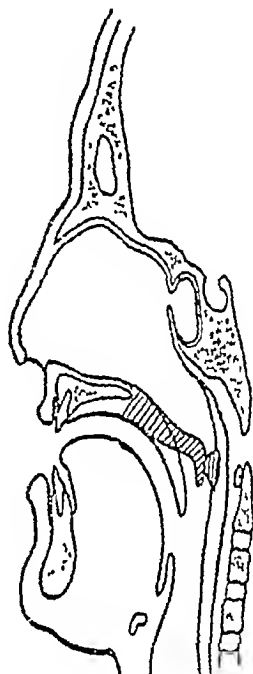
suggests the possibility of disease of one of the tarsal bones. In some cases, however, a congenital defect or malformation of the tarsus is the cause of the rigidity. Additional ossifications may be found on the inner side of the scaphoid (os tibiale externum) or on the top of the scaphoid (Pirie's ossicle). Alterations in shape in the mid-tarsal region—that is, of the scaphoid or of the anterior end of the os calcis—may also occur, and sometimes pain or rigidity is an indication of Kohler's disease of the scaphoid. In rigid flat foot, when disease or deformity have been excluded, the first indication is to overcome the rigidity. This can usually be accomplished by rest and support. It is essential to stop the strain of continuous standing in children who have been sent to work, and to see that proper shoes are supplied with adequate support to throw the weight on to the outer border. Manipulations under an anæsthetic are sometimes useful to overcome adhesions that have been allowed to form as the result of prolonged rigidity, and operations upon the tendons and nerves have sometimes been carried out in order to procure relaxation. These are, however, only required in neglected cases

Experience has shown that the wearing of an adequate support (which may mean a side-steel up the outer side of the leg), with relative rest, will usually result in a gradual disappearance of the spasm, and physical treatment will then gradually effect a cure. These cases of rigid flat foot are uncommon outside of hospitals.

In many cases of apparent flat foot a print of the sole will show that there is really a very good arch. The deformity is a talipes valgus—that is, the foot is everted and the weight thrown on to the inner side without the arch being depressed. Such cases require the same treatment as cases of real flat foot of the same degree, but the prognosis is better, because once

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ensure apposition of its tip and postero lateral
es to the posterior wall of the pharynx when the
necessity for this manœuvre arises.



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the deformity is a concealed one, and we cannot therefore claim that we urge closure for æsthetic reasons. The real justification for operation is to secure the maximum of perfection in the oro-nasal shelf and to ensure that, when the necessity arises, there shall be no direct communication between nasal and oral cavities. Thus isolation is essential during the act of swallowing and in the phonation or pronunciation of all consonants, with the exception of M, N, and NG. The completion of the oro-nasal shelf involves the closure of the defect in the hard and in the soft palates; both ideals are difficult to achieve, but the successful correction of the soft palate is infinitely more important than the closure of the gap in the hard palate. In the latter, even if closure is incomplete, the tongue plays the part of a natural obturator and temporarily closes the gap, while in later life an artificial obturator can be adjusted to correct the error.

Where the soft palate is concerned the situation is entirely different. It might seem at first sight that if closure of the soft palate cleft is secured, the optimum of success has been obtained. This is not so, for it is important that not only shall the cleft be closed, but that the soft palate shall be of such a length after operation that, when raised by the contraction of the appropriate muscles, its tip and postero-lateral edges come into contact with the posterior wall of the pharynx, and so shut off the posterior part of the mouth and the upper portion of the oro-pharynx from the naso-pharynx. It is evident that operative interference with the soft palate is liable to imperil the essentials of success, because it is apt to result in such a degree of shortening that efficient apposition between soft palate and posterior pharyngeal wall is impossible.

The ideals of a completely successful operation, therefore, are closure of the clefts in hard and soft palates, and the securing of a soft palate long enough

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to ensure apposition of its tip and postero-lateral edges to the posterior wall of the pharynx when the necessity for this manœuvre arises

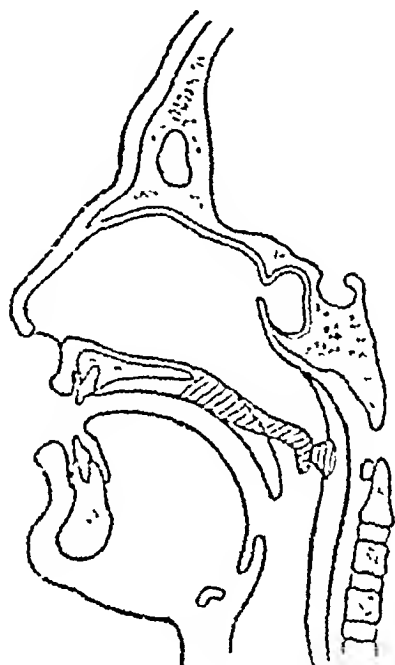


FIG. 4.—The valvular function of the soft palate

In the elevated position of the soft palate the tip and postero-lateral edges come into contact with that portion of the superior constrictor which forms the pharyngeal sphincter—i.e. a valve.

(b) *The most suitable age for operation*—Much discussion has centred round this question, opinions are still divided, and in all likelihood they will remain so.

It is an accepted axiom that the sooner a congenital error is corrected the more likely is it that future growth and development will proceed along satisfactory lines. In general, the truth of this axiom applies to cleft palate, but the principle must be weighed in conjunction with the conditions peculiar to the situation. There are two age periods at which the propriety of operation may be discussed: at some period within the first three months of life or at the time when the

child is beginning to articulate words and phrases—an age period which, on an average, we may place at eighteen months. Each election period has advantages and disadvantages, and if we appreciate these we shall be in a position to judge their relative importance and to justify an ultimate selection.

The axiom that early correction affords the best opportunity for natural development finds its application in the early operation; moreover, the surgeon is dealing with the mouth cavity at an age when the flora of infection is relatively small. It is also true that hæmorrhage and shock are less in the early weeks of life than at a later period. These are the advantages claimed in favour of the earlier operation, and we must agree that they are worthy of the fullest consideration. There is another side to the picture, however, and it is well that we should appreciate it. Early operation is associated with a higher mortality than applies to the later period, the relatively thin character of the mucoperiosteum of the hard palate imperils the process of healing in this region, while interference with the soft palate at this early age is apt to be followed by shrinkage and contraction of its tissues, so that its efficiency as a valve is affected. In my opinion the disadvantages outweigh the advantages, and I therefore advocate and practise operation at the later age, when the child is about eighteen months old. At this period the operation can be carried through with the minimum of risk, and with a relatively good assurance that healing by first intention will occur, it is, moreover, the age at which the articulation of words and sentences is taking shape, so that we gain at this critical time the advantages of a complete oro-nasal shelf. It is probably true that if operation is postponed to a still later date the risk of certain dangerous post-operative complications is lessened, but in the meantime speech may have acquired the phonetic errors which are

afterwards so difficult to eradicate.

(c) *The regime of the pre-operative period.*—This aspect of the question may be conveniently divided into general and local considerations.

General considerations.—No child should be submitted to the risk of a cleft palate operation unless the general health is in a satisfactory state, and as the weight chart is perhaps the best guide, I may put the recommendation in the precise form that at the time of operation the child shall be gaining weight and be otherwise in a good condition of health. These considerations are important, because the surgeon is sometimes faced with the demand that operation shall be done because the weight is falling, and the inference is drawn that the deterioration is dependent on the palate error, with the further, and often unjustifiable, assumption that when the error is remedied the weight and general condition will improve.

It is undoubtedly true that the child afflicted with cleft palate may be difficult to nourish, but with care and patience the difficulties are overcome. If breast feeding is impossible (and it certainly will be if the error is at all severe) bottle feeding is resorted to, the bottle being fitted with a large soft teat (Carmichael's), which fills the mouth and occludes the palate opening. The movements of the child's jaws and tongue exercise sufficient suction action to force the milk out of the teat, and the fluid is carried directly into the pharynx. If this fails, feeding by spoon or by syringe is required, the milk being placed as far back as possible. In certain cases of peculiar difficulty the child may be fed while lying on its side, the milk being introduced into the hollow of the under cheek, so that it gradually trickles back into the pharynx, and is swallowed. By one or other of these means the feeding difficulty can be overcome, and the general health and weight

improved.

Local considerations.—Although it is impossible to ensure any degree of asepticity in the mouth, steps must be taken to eliminate any obvious source of superadded infection; the teeth should be overhauled, the tonsillar and adenoid tissues investigated, and the mucous surface of the nose examined. Any suspicion of catarrh is regarded as a contra-indication to operation. It is unwise to attempt to diminish the flora of the mouth by means of antiseptics, for any temporary reduction is likely to be followed by an exacerbation which may imperil the success of the surgical procedure.

During the days immediately succeeding operation feeding is carried out with a spoon, and it is well, therefore, to accustom the child to this process for a few days before the operation. Violent crying in the immediate post-operative period may endanger the security of the suture line, and steps are therefore taken to induce an artificial placidity by the administration of a sedative for some days preceding the operation. Chloral and bromide or the elixir of luminal are the drugs of common choice.

(d) *The principles of operation.*—Bearing in mind that complete closure of the cleft and the provision of an efficient soft palate are the aims of the operation, the recent trend of operative interference has been directed towards designing a procedure which ensures a long and mobile soft palate. The early operations of uranoplasty aimed at closure of the cleft by separation of the muco-periosteum of the hard palate and the mobilization of the soft palate so that the raw edges of the cleft could be approximated and sutured. This procedure, associated with the names of Ferguson and Langenbeck, is still a popular method of operation, but it is apparent that it implies no special attempt to ensure an efficient soft palate.

The next operation in historical sequence was the

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a transposition of the muco-periosteum of the hard palate, together with the entire soft palate. The tissues are transposed backwards and the soft palate is thus mobilized and elongated. Lemberg records 45 cases with 44 satisfactory results. In 1928, Wardill of Newcastle reported an entirely new departure in technique. Where the soft palate makes contact with the posterior wall of the pharynx there is a circular band of muscle derived from the fibres of the superior constrictor. When the soft palate rises, as in the acts of swallowing and articulating, the circular fibres contract and elevate a transverse ridge upon the posterior pharyngeal wall (Passavant's ridge.) It is believed that the elevation of the ridge is intended to increase the efficiency of the valvular arrangements in this region, and Wardill's operation is designed to exaggerate the height of Passavant's ridge by a simple plastic procedure, the palate cleft being closed by the Langenbeck-Ferguson technique.

Such is a summary of the evolution of the operative procedure, and the peculiar interest of the study is the demonstration of the present tendency to plan the operation with a view to restoring the function of the soft palate rather than to concentrate on the closure of the cleft.

(c) *The post-operative regime.*—It is our practice, where hospital work is concerned, to isolate cleft palate cases in separate rooms or cubicles, as we believe there is a risk of aerial infection of the wound if they are nursed in a surgical ward where septic cases are treated.

The baby is nursed in a sitting position, straight elbow splints being applied to prevent the child from inserting its fingers into its mouth. The bromide and chloral mixture given during the pre-operative period is continued, and, if there is much distress in the early post-operative phase a hypodermic of morphia or omnopon is

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given. Hypodermics of atropine (grs 1/200) are repeated twice daily for three days following the operation in order to diminish salivation. The edges of the palate incision are painted with 2 per cent. argyrol as soon as the operation is completed, and this is repeated once or twice a day during the post-operative phase, if it can be done without unduly alarming the child. Sterile water given with a sterile spoon is allowed as soon as the child has recovered consciousness, and for five days succeeding operation the child is nourished on sterile water, albumen water, orange juice, and 5 per cent. glucose in water, all fluids being sterilized and administered by a sterile appliance. If it is thought advisable the mouth may be occasionally irrigated by a stream of sterile water from a glass syringe. The sutures are removed on the eighth day, and an anæsthetic is given to enable this to be done.

The problem of after-treatment, however, is only beginning when the sutures have been removed. The closure of the palate error will not ensure clearness and accuracy in articulation—it only provides the necessary mechanism—and a long period of careful training in breathing and in phonetics is essential if a standard approaching normality is to be attained. As soon, therefore, as circumstances permit, the child is placed under the care of a teacher qualified in this type of instruction.

(f) *The results of surgical interference.*—It is not a difficult matter to secure closure of the cleft; in 104 cases under my own observation complete closure was achieved in 47 per cent., there were minor defects of healing in 35 per cent., in 15 per cent. the error involved a third or more of the suture line, in 3 per cent. the entire suture line gave way. These figures afford an idea of the anatomical results, and when analysed in respect of different types of operation they are of interest to the surgeon. Of much greater importance,

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Reynolds,⁴ in 1921, again drew attention to the high death-rate of empyema in infants. In their series of 71 cases under two years of age, there were 39 deaths, a mortality of 55 per cent. They then went on to describe a simplified Bulau method in which a close-fitting rubber tube was passed deeply into the pleural cavity through a short silver cannula (which was retained in position), and drainage secured by a suction apparatus. This method used in 10 cases was successful in all, three of them being under two years of age. Quite recently F. G. Thomson⁵ and H. Burrows⁶ have each published good results obtained by this method, and have strongly advocated its general adoption in empyema.

In this article I shall give a brief statement of the results obtained in empyema in childhood by a method which is different from the cannula closed-drainage of Poynton and Reynolds, and which in its principle really goes back to the old method of repeated aspiration that was in vogue before the surgical procedures of open drainage of the pleura were generally adopted. The following results obtained by the old method of repeated aspiration were collected by Holt.⁷ In 139 cases, 25 were cured (8 by a single aspiration), 13 died; 101 were submitted to other forms of treatment (the results were not stated). It is regrettable that the ages in this interesting series are not given. But in 1928, Burghard,⁸ using only repeated aspiration in seventeen cases of empyema in infants under one year, had 8 recoveries and 9 deaths—figures which compare favourably with other methods of treatment at this age.

The modified method of repeated aspiration which I have used is as follows. Aspiration was done in the ordinary way three or four times over a varying period, usually about two weeks. If pus was then still obtained in amount more than one ounce, a short silver cannula,

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with a wide circle-hilt, was passed into the pleura by a trocar, and secured in position by layers of gauze soaked in collodion; a piece of aspiration-tubing, about an inch in length was fitted to the cannula, and clipped or stoppered, then imbedded in wool and bandaged over. Pus was aspirated from the cannula twice daily, once daily, or at longer intervals according to its quantity, the tube being at once sealed again. Both during the period of preliminary aspiration and after



FIG. 1 shows the condition of the right pleura the day before insertion of cannula

Jane A., et 5 $\frac{1}{2}$. Pneumonia, with acute pain in the right side at the outset, began 17 days ago. On admission, September 17, 1928, had all the signs of right empyema, with some displacement of the heart to the left. Weak, pale, and thin, but not acutely or very seriously ill. Immediate aspiration of foul pus, containing pneumococci, staphylococci, and a bacillus (probably Pfeiffer's influenza bacillus). Cannula aspiration on the third day, rapidly removed large amounts of offensive pus, and a week later only 50 cc daily were obtained, total amount of pus withdrawn, 50 oz. Weight began to increase rapidly after a week of cannula aspiration, and thereafter progress was steady and rapid. Cannula in position for 19 days, when the discharge had become very scanty and thin, open drainage of the sinus for a week longer.

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the inserting of the cannula, 5 to 10 c cm. of 1 per cent. iodoform in sterile liquid paraffin were injected into the pleural cavity after each withdrawal of pus. When by thus repeated (usually daily) cannula-aspiration the amount of pus withdrawn became reduced to about 10 c cm. daily—a reduction usually obtained in from seven to fourteen days—the cannula was removed, and



FIG. 2.—A week later, when practically all pus had been removed (10% of). The chest is almost in position.

open drainage of the narrow sinus was effected by a narrow tube passed deeply into the pleura. This rubber drain was removed when the discharge became thin, serous, and scanty. The whole process was thus one of repeated aspiration *without drainage*, until the empyema cavity had been reduced to a narrow sinus with a scanty discharge; only then was it terminated by open drainage. In a certain number of cases, of which details will be given later, cure was effected by

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the preliminary process of repeated (or single) aspiration

This method was first tried in the end of 1921, and has now been employed for eight years. At first used cautiously in the more severe cases in young children, it has been tried in all types of empyema in children. Up to date it has been used in 61 cases of

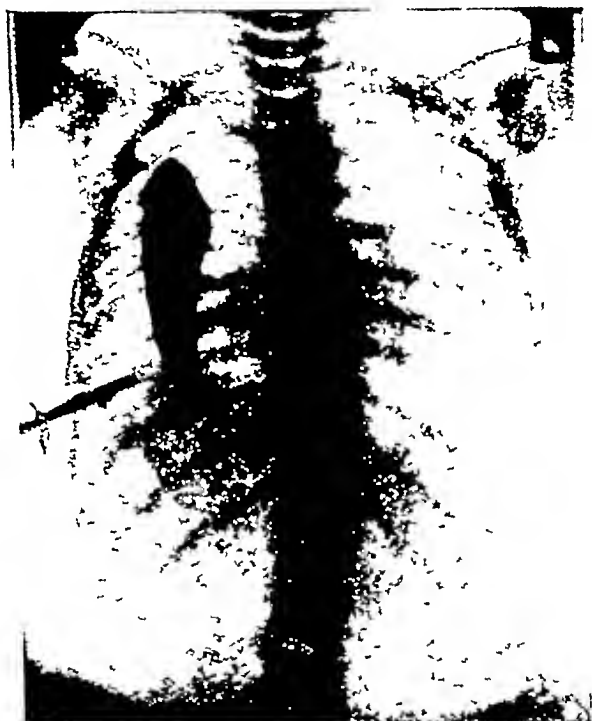


FIG 3—Five days later, showing the residual cavity outlined by lipiodol, and separated from the cannula by a narrow sinus. Discharged from hospital in good health, eight months later, won the first prize in her class race at the school sports, seen again a few weeks ago, and eighteen months after her discharge, when she was found in excellent health with good expansion of the affected lung

empyema, the great majority were pneumococcal and the results are shown in the following Table 1. From the series there have been excluded two groups of cases. The first was a fatal group in which empyema was only discovered at post-mortem examina-

tion, or in moribund cases where a small amount of sero-purulent fluid was obtained before death without further aspiration or other surgical treatment being attempted. The other was a group of non-purulent, but inflammatory pleural exudates, 4 pneumococcal, 1 streptococcal, and 1 staphylococcal, in all of which one or more aspirations were followed by recovery. The following table thus deals with all cases of pleural empyema under my charge in children up to 12 years (pus being shown to be present) over a period of eight years, and gives the results of their treatment by the methods of surgical drainage, on the one hand, and this special method of aspiration on the other. The results are given in different age periods.

A comparison between the results obtained by these two methods of treatment—surgical drainage and aspiration—can hardly be made, certainly not in the early age periods when the numbers of cases were small, and there was a tendency to select for surgical treatment the more chronic cases, producing a concentration of the more severe and acute cases in the aspiration group. As to the period, 5-12 years, all that can be said, without a detailed knowledge of the cases, is that the results in both groups were good, and about equally so.

Aspiration and Cannula-Aspiration Group—The total was 61 cases, with 18 deaths; and of the 18 deaths, 16 occurred in the first three years, and 13 in the first two years. Some further remarks may be made on the cases in the various age periods.

Birth to one year.—Of the three deaths in this group, one was streptococcal empyema in an infant of six weeks, and another was in a case of extensive confluent bronchopneumonia in a baby of eight months. Of the three recoveries, two were obtained by needle-aspiration only; the clinical record of the third is given in

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chart 1.

One to two years.—In this group there was a larger number of cases and an even higher death-rate (10

TABLE I.

EMPHYEMA IN INFANTS AND CHILDREN RESULTS OF TREATMENT.

Age Period.	Surgical Drainage		
	Total.	Deaths	Recoveries
Birth to 1 year .	2	1	1
1 to 2 years . .	2	1	1
2 to 3 years . .	2	0	2
3 to 5 years ...	2	1	1
5 to 12 years . . .	15	1	14
Total	23	4	19

Age Period.	Repeated Aspiration and Cannula-Aspiration		
	Total.	Deaths	Recoveries.
Birth to 1 year .	6	3	3
1 to 2 years . .	18	10	8
2 to 3 years	14	3	11
3 to 5 years .	5	1	4
5 to 12 years	18	1	17
Total .	61	18	43

deaths in 18 cases). But among these fatal cases were three in which empyema was only a minor incident,

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along with acute and extensive disease of the lung or pericardium; these may be regarded as inevitable deaths and beyond the hope of remedy by any present form of treatment. Brief details of these "inevitable deaths" may be given.

(1) Jenny S, $\text{æt } 1\frac{1}{2}$ years. Treatment, aspiration only. Autopsy: extensive chronic broncho pneumonia with acute bronchiectasis, one of the cavities perforating the pleura and causing empyema of mixed infection.

(2) Charles H, $\text{æt } 1\frac{1}{2}$ years. Treatment, aspiration only, twice, two days before death. Autopsy: extensive double pneumonia with numerous acute abscesses, all pus had been evacuated from the affected pleura.

(3) Ruby R, $\text{æt } 1\frac{1}{2}$ years. Treatment, needle-aspiration and cannula-aspiration. Autopsy: in addition to the empyema, a chronic pyopericardium.

Of the remaining 7 deaths in this group, four were cases of double empyema.

Two to three years.—This group of 14 cases shows a definite fall in the death-rate. And among the 3 deaths, 2 may fairly be added to the above list of "inevitable deaths."

(4) Lily M'G, $\text{æt } 2\frac{1}{2}$. A feeble Mongolian mental defective, with double pneumonia, lived four days in hospital, a small amount of thin pus twice aspirated before death. No autopsy.

(5) Albert T, $\text{æt } 2$ years, admitted moribund with left pyopneumothorax, aspiration of 1 oz of thin pus, death one day later. No autopsy.

Three to five years.—This small group of 5 cases shows one death in which empyema was complicated by the development of scarlet fever.

Five to twelve years.—In the group of 18 cases there was one death. It included one case of double empyema; and two of pyopneumothorax, neither of which, however, was dangerously ill. A clinical record of a case of this group is given in chart 2, in which 6½ pints of pus were withdrawn by aspiration.

Comparison of mortality figures in different methods of treatment of empyema.—In this paper, three different methods of treatment have been alluded to: surgical open drainage with or without resection of rib; the

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Bulau method of closed drainage in its various modifications, and the cannula-aspiration method. A comparison of results obtained by these different methods is desirable in a sufficient number of cases. I cannot find a record of a large series of cases of empyema in the first three years of life, treated by the much-simplified Bulau method introduced by Poynton and Reynolds. But Spence's³ series of 142 cases treated by a modified Bulau operation are available; and Souttar⁹ has published the figures for the London Hospital from 1909-23, which I assume to be obtained by the methods of open drainage.

Spence deducted from his series 18 cases with 16 deaths, in which the child was so ill that aspiration only was employed. To make my figures comparable with his, I shall therefore deduct from my totals the 5 cases of "inevitable death" detailed in the last paragraph; and the revised figures will be found stated as "corrected deaths" in two age periods in the table below. This may render comparison with the London Hospital figures unfair if these include all cases of empyema, however desperate. In any case, I do not wish to press the comparison, as in my series the numbers of cases in the different age groups are small compared with the New York and London figures; although it may be noted that in all three series they cover a period of seven years or more.

Even if Spence's fatal cases under two years treated by aspiration only (15) are added to his total for the first two years, his mortality (56 per cent.) is definitely lower than that of the London figures given by Souttar (66 per cent.) On the other hand, in Poynton and Reynolds' series under 2 years, and largely treated by the ordinary surgical procedures, there was a mortality of only 55 per cent. (71 cases, 39 deaths). This shows the difficulties and fallacies of comparing different

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empyema (Winnie M) all were cases of localized empyemata confined to the base or to some other part of the pleura, and the localized character of the abscess was sometimes clearly shown on an X-ray film. Where an empyema is localized, the results of table 3 show that one or more aspirations are often able to effect a cure. The after-results in all these cases have been very good; and so far none of the above cases have been known to relapse or recur, although several of them have been seen and examined four years after their discharge from hospital.

DISCUSSION.

The mere setting down of results in figures and pitting them against others is seldom convincing; and some general discussion may be useful. It has been said very often and in different ways that the principal factor in empyema in young children is not the presence of pus in the pleural cavity, but the condition of the lung behind the pleura and the general state of the child. But it is a truth that cannot be repeated too often; and it is doubtful if it has yet received its full value in the consideration of treatment. Indeed, it is possible that the occurrence of purulent pleurisy in pneumonia may be for a time a beneficial process, producing a partial collapse of the inflamed lung and forming an active immunizing depot; and very rarely is it an urgent complication demanding immediate and emergency treatment. Further, it is doubtful if empyema, as such, is more deadly in the first two years of life than later, its high death-rate then is due to the more deadly nature of pneumonia at this period of life. The division into synpneumonic and metapneumonic empyema, suggested by Gerhardt and emphasized by Cameron has been of practical value in directing attention to the condition of the lung. But it is doubtful if empyema is ever metapneumonic.

although often it is not discovered until the acute pneumonic process has subsided. The terms acute, and sub-acute, and chronic empyema suggested by Poynton seem more accurate and as serviceable.

In treating empyema we face a dilemma of which the greater and more dangerous horn is the inflamed lung, and the lesser is the presence of pus in the pleura. If pus could be emptied from the pleura without danger to the lung—congested, collapsed, and probably still in active inflammation—the right treatment would be immediate and thorough surgical drainage. But such treatment dealing effectively with the lesser horn, is likely (in the young child) to throw the child upon the far more dangerous horn of pneumonia.

The Bulau method of closed drainage in its various modifications pays less regard to the pleura, it does not secure the same thorough evacuation of pus, nor the same efficiency of drainage. But it is more likely to prevent mixed infection, and it favours a re-expansion of the lung. And its results have been so good as to justify a much more extensive trial.

In the method of repeated aspiration and cannula-aspiration described in this article, the principle of drainage is discarded altogether, and there is no thoroughgoing attempt at immediate and complete evacuation of pus. The broad results of a trial of this method in 61 cases over a period of eight years have been :—

In the first two years of life, 24 cases and 13 deaths; or if the 3 “inevitable deaths” (Nos. 1–3 on p. 226) are deducted, 21 cases and 10 deaths, and of these 10 deaths, 4 were cases of double empyema.

In the third year (when statistics based on any method show a decided drop), 14 cases and 3 deaths, or, again deducting 2 “inevitable deaths” (Nos. 4 and 5 on p. 226), 12 cases and 1

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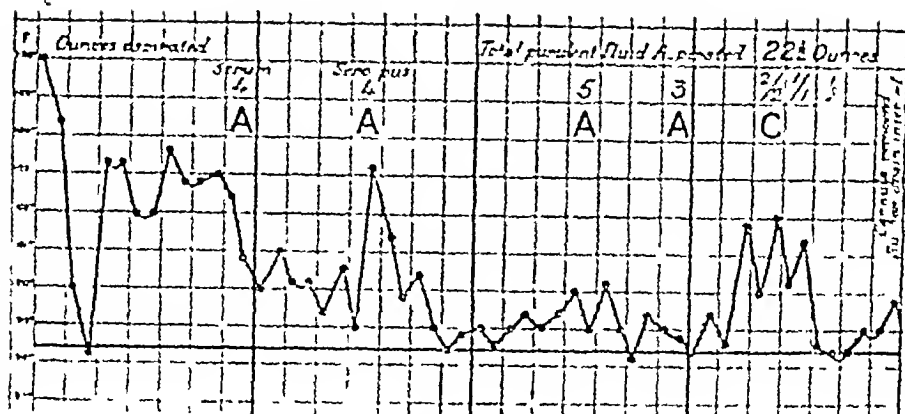
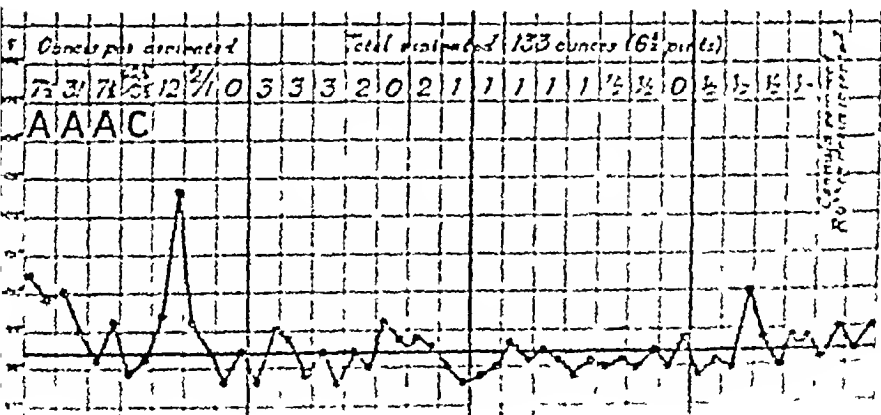


CHART I.—Charles W., *et* 11 months. Heavy breathing and slight coughing with prostration and fever for 5 days before admission. On examination, 2-6-20, signs of pneumonia at base of left lower lobe, temperature 106°, pulse 156, respiration 56, great dyspnoea and some cyanosis. Increasing and extensive dullness over left lung, on seventh day, aspiration of 4 oz serum containing pneumococci from left pleura, a second aspiration of 4 oz seropurulent fluid four days later, followed by definite improvement in general condition. Later aspirations yielded pus. Short period of cannula aspiration and its removal followed by partial closure and unsatisfactory drainage from sinus, slow convalescence complicated by pneumonia of right lower lobe but general condition thereafter never gave real anxiety. Three months in hospital. Discharged in very good health, without cough and with only slight percussion dullness at left base, seen several months later, and general and local condition found to be very satisfactory.



Case 2 - James H. at 61 years. Pneumonia 2 weeks before admission. On admission 19-2-24 a lot of very large left pleural effusion, a firm, rounded, and much displacement of heart to the right of a normal, extreme weakness and pallor, with some induration of the lungs after three weeks in bed. Respiratory distress, some cough, 100 and a pulse coming up on extra system. Gonorrhea infection for three weeks. Total amount of pus withdrawn 1 1/2 pint. The pleural cavity filled with pus and a 100 cc. of pus was removed. The open area was closed and the patient 10 weeks after pneumonia of cavity. In a well recovered. The patient in good health with no further complaint or physical evidence of disease at the left lung on the 2nd of May. Some 1 1/2 years later in good health.

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method, for this communicating sinus may close before pus formation has ceased in the cavity; and this was shown to have happened at post-mortem examination in several cases. I think this may be prevented by the use of a long drainage tube after removal of the cannula, passing it deeply into the pleura along the sinus for 5 or 6 in. It is interesting that this premature closure of the sinus has never happened in the numerous cases of large empyema in older children in which the cannula-aspiration method was tried

Some of the advantages and disadvantages of the method may be briefly mentioned in conclusion. As regards recovery, it has given good results in a large number of cases of empyema throughout childhood; not merely recovery of life, but of sound and vigorous health with efficient lung movement and with no more pleural thickening than by the ordinary methods. It is a method which causes the minimum of shock and general disturbance in the actual operative procedure; and it avoids altogether the pain and fear unavoidable in the method of open drainage. In my experience there has been no trouble from persistent discharging sinus. But there are also disadvantages. Although a "simple" method, it does not quickly remove all pus from the pleura, it means a longer period of treatment than in the successful open drainage case; and it requires during that time constant vigilance.

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the treatment of scarlet fever since 1897, but never on an extensive scale, owing to the difficulty in obtaining it. Although according to Schamberg and Kolmer scarlatinal antitoxin in the United States is now prepared by the immunization of horses with both the toxin and the organism, in this country the Dicks' method of immunization by toxin only is employed.

The great majority of clinicians who tried the new serum expressed their satisfaction with the results, but a few dissentients maintained that it was unnecessary in mild cases and useless in those of a malignant type. The most striking example of the failure of the antitoxin was in Rumania, where the type of scarlet fever tends to be unusually severe and much better results were obtained by injection of convalescent serum than from the use of scarlatinal antitoxin (Ciuea, Craeninescu and Barov; Stroë and Hortopan). Mention may also be made of a severe epidemic with a mortality of 15 per cent in the Italian commune of S. Onofrio (Catanzaro) reported by Greco, who came to the conclusion that antitoxin did not shorten or modify the course of the disease. Lastly, from observations in the infectious department of the Wilhelmina Hospital, Vienna, on 420 cases of scarlet fever, half of which received symptomatic treatment only, while the other half were treated with serum Gabriel, without denying that serum conferred some benefit, was by no means so enthusiastic as most of his predecessors. In his experience, the serum was particularly disappointing in the treatment of severe cases and did not appear to have any effect on the incidence and severity of nephritis.

PERSONAL EXPERIENCE.

My own experience of the treatment of scarlet fever by antitoxin dates from March 1926, when on appointment as Medical Superintendent of the

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Western Hospital I at once started a trial of the new remedy, the remarkable results of which were hitherto known to me only from a study of the literature. It must be admitted that my first impressions were distinctly unfavourable; not only was the benefit derived from the injections not at all obvious, but the serum reactions were not infrequently very severe and sometimes caused the patient more distress than the actual attack of scarlet fever. The subsequent introduction, however, of a refined and more potent serum, which reduced the frequency and severity of serum sickness and had a much more pronounced effect on the toxic phenomena, altered my at first unfavourable opinion and convinced me of the value of the treatment. The importance of the subject, indeed, suggested that the serum treatment of scarlet fever would be suitable for a conjoint discussion with the Medical Section during my presidency of the Section of the Study of Disease in Children of the Royal Society of Medicine. The meeting was held on February 25, 1927, when the few speakers, including Dr. E. W. Goodall who opened the discussion, and myself, who had had any personal experience of scarlatinal antitoxin, admitted that they had employed it in a comparatively small number of cases owing to the habitually mild character of the disease, but were on the whole satisfied with the results.

Although some clinicians, such as Blake and Trask, Cushing, Kolmer, and Banks and Mackenzie recommend that antitoxin should be given as a routine treatment to every definite case of scarlet fever in the early stage, my own view, which is shared by the medical staff of the other London fever hospitals, is that the antitoxin should be reserved for those cases which show any signs of severity. Owing to the habitually mild character of scarlet fever during the last few years, we have not found it necessary at the Western

Hospital to use it on more than about 10 per cent. the cases, or in 450 cases out of over 4,000 scarlet fever patients admitted since March 1926 up to the present time (April 1930).

As stated elsewhere (1929) I have been in the habit of classifying the cases into three groups according to the therapeutic effect of the antitoxin. The first group consists of 214 cases in which the benefit was immediate and dramatic, as shown by improvement of the general condition, fall of temperature to normal within 24 hours and rapid disappearance of the eruption, though as a rule the constitutional change took place some time before the rash had faded. In the second group (200 cases), numerically somewhat less than the first, the improvement, though definite, was less sudden and pronounced, while in the third group, which forms only a small minority (36 cases) and contains a certain number of fatal cases, no obvious benefit of any kind resulted from the treatment. The serum was almost always injected intramuscularly and only in a few very severe cases intravenously.

In spite of their claim that it stops the acute process within a few hours, prevents complications and permanent damage to health, and greatly reduces the period of residence in hospital, the routine administration of antitoxin intravenously in all definite cases of scarlet fever up to the fifth or sixth day, as carried out by Banks and Mackenzie at the Leicester Isolation Hospital, does not appear to me to be justifiable, in view of the admission that the intravenous injection was accompanied by a rigor and rise of temperature in nearly 60 per cent and in one instance by death apparently due to protein shock. Such treatment indeed can be regarded as an excellent example of the *minus minus ligentia* which Sydenham derided was the only cause of death in scarlet fever. The simultaneous route, advocated by Goodall

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through fear of an intramuscular abscess, which did not occur in my series, was not employed. Repeated injections were required much less frequently than in the case of diphtheria, as is shown by the fact that out of 450 cases only 21 had 2 injections and 3, three injections. The doses used at the Western Hospital are usually 30 to 40 c cm irrespective of age, which in our series ranged from 1 to 51 years.

As already stated, the serum reactions are now less frequent and severe than they used to be. In the total series of 450 cases rashes were observed in 202 or 44.8 per cent. The eruption in every case except in one instance with a circinate erythema, was urticarial, which was either localized to the site of injection, or more or less generalized. As a rule it was not accompanied by any rise of temperature or constitutional disturbance, 17 patients, however, had more or less pyrexia, and 4 pain in the joints.

In scarlet fever, as in all other diseases treated by antitoxin, it is important that the serum should be given as soon as possible, but it is a mistake to suppose that it is ineffective even several days after the onset.

It is true that the great majority, namely, 173 cases belonging to the first group, came under treatment within the first 3 days of the disease, but 67 were first injected on the fourth day, 20 on the fifth, eight on the 6th and one on the 7th, and all made a rapid and complete recovery. On the other hand, by no means all the patients belonging to my third group came under treatment late, as 14 were first injected on the 2nd, 16 on the 3rd and 9 on the 4th.

I have been very favourably impressed by the action of serum in septic cases in which a tendency to ulceration of the fauces is apparently checked by this means. There is often a remarkable improvement in the general condition even though the temperature does not fall by crisis to normal.

Like most observers, I have come to the conclusion that the chief value of the serum treatment of scarlet fever lies in its power to alleviate the toxic symptoms of the acute stage, while it has little if any action in preventing or curing complications. It is true that the incidence of complications in the present series of 450 cases was low, namely, otitis media 12 cases, two of which developed mastoid abscess, nephritis one case, only, albuminuria of a few days' duration 28 cases, rheumatism 10 cases, and adenitis of convalescence 16 cases, of which 3 suppurated. In view of the fact that Burton and Bahnam observed relapses in 4.16 per cent. of their 432 cases of scarlet fever treated by antitoxin, it is remarkable that only 1 of my series developed a relapse, which occurred on the 34th day. The frequency of complications, however, in scarlet fever, especially of nephritis, had so much diminished in recent years before the introduction of antitoxin, that I am unwilling to regard the new treatment as in any way responsible. Owing to the benefit accruing from the use of the serum in cases of any severity it did not seem to be justifiable to deprive patients of the advantages of this method by the use of a control series in which it was not employed.

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three parts and calomel one part, fomentations of white lint (boric fomentations are only too irritating) help only for the first twenty-four hours, but after the first few days in hospital, when the child has improved up to a point and then stops, continued changes of external treatment, the employment of vaccines, medicated baths and patented ointments evinces lack of experience and self-confidence. Soap and water and calamine lotion—or calamine liniment if the skin be very dry—will give as quick a recovery rate as will the employment of any wide range of skin pharmacy. These children have to be renewed as a whole before their skin recovers, their dermatitis is not an accidental infection to be wiped away, but an expression of grave general poverty of resistance. Amongst this class, too, one still sees gangrenous dermatitis. Not only after measles do we get the cancrum oris or *nomma* known *ex libris* to every student, but, spontaneously and without intervention, large areas of skin and subcutaneous tissue may necrose anywhere, or behind the ear or on the thorax, and the child may rapidly become toxic by septic absorption from a large festid slough, recovery is always possible.

As a contrast, among the well-cared-for and well-fed, the so-called infantile eczema is a perennial problem. Practitioners are familiar with all degrees, from a patchy pink scaling of the scalp to a moist raw redness that extends over the whole face, except the orbits and circum-oral region, then spreads to the creases of the neck and all the flexures and in large patches on the body. It is said that these children are hydro-labes, that they are allergic, have a poor sugar tolerance, are protein sensitive—they have an interesting intestinal flora and defective calcium metabolism, but it is still true that they are remarkably healthy and that they very seldom die. Turner's insistence on an infection of the

mencement in the head, but some cases begin most assuredly on the cheeks, and the scalp remains clean throughout. In some cases the use of strong household soap, unsuited to infant's skin, can certainly be blamed, in others the development of psoriasis years afterwards shows that there was from birth a predestined fragility of the skin and that the present reaction is probably the first act only of a long dermatological drama over which we may have no decisive control. The liability of these patients to bronchitis, bronchopneumonia and to asthma is known, but I have also often noted their numerous unexplained pyrexias, which on catheteric examination can be shown by the laboratory to be accompanied by coli-bacilluria without notable frequency or scalding or bladder pain.

If these cases have gone on for any length of time they must be removed from their parents, who only too obviously are worn out and on the verge of a breakdown. The child's diet needs no great adjustments, no one change will effect a cure, no one fault in diet is causative. The mother or nurse may note that bananas, or cream, or apple, or chocolate, and sometimes egg exacerbate the irritation, but this will remove only one intervening cause, the disease is still active after this has been eliminated. Free drinking is to be encouraged, and constipation, only if certainly present, treated. Splinting is essential, an infant with this disease will draw blood widely and freely if left alone unimpeded for ten seconds. These patients itch intensely, they develop easily a formidable itch and scratch reflex which will keep up for many months a traumatic dermatitis. When the skin is at all widely inflamed, then the skin of the face is light sensitive, and exposure to bright daylight will keep the cheeks and lower forehead red, irritable, cracked and oozing or scaling long after the limbs have healed, hence, a mask to the face is, I think, an essential help to break

a vicious circle of inflammation, itching, scratching, photo-sensitiveness, actinic dermatitis and so on. Two external applications are of great service, namely, calamine liniment and pasta zinci, the hair must be kept clipped short, and an occasional hot fomentation will clear off any recent accumulation of scab. Occasionally, when the body has cleared up, we are left with an inveterate follicular pustulation of the scalp, not at all unlike the sycosis barbe of adult life. This must be fought at once, or a dermatological bad bargain will haunt the clinic for years. Even at the age of three, I would counsel therapeutic epilation with X-rays or thallium acetate, this empties the hair follicles in three weeks, and swabbing the reddened scalp thrice daily with lotio glycerini plumbi subacetatis will bring about a speedy cure. Most practitioners are aware that post-auricular intertrigo and fissures behind the ears may last for months or years after one of these general attacks have subsided. They must always be watched for and treated by a small dose of X-rays, rarely repeated, by ethereal silver nitrate paint B P, or by spraying on Sir Lenthal Cheate's (Fildes') malachite green. Bromides have a serviceable place in treatment, a dose of seven to ten grains thrice daily lessens the readiness to scratch; but a word of warning must be given against the employment of the barbitone group, i.e. veronal, medinal, etc. In children these sedatives, even in small doses, are, if repeated, tissue poisons, and under their influence small points of epidermal sepsis become deep follicular pustules, and pustules become boils, and boils become foci of septicæmia—this I have seen, and I have seen death result from, in my opinion, unwise persistence in their use. The administration of X-rays and ultra-violet light to the patients is dangerous, by either, acute moist dermatitis may be at once made widespread, even when treatment is confined to the scalp the reaction is formidable to the

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uninitiated It is well to commence treatment by three days' rest to the skin, for a mother, with a chemist's help, may have applied a whole series of patent ointments, the effect of which must be allowed for before any scheme of treatment is initiated Ordinarily, if two or more children are similarly affected with widespread pustules or scabs, one may safely diagnose scabies, but it is not always so I have seen whole families of children all re-admitted together, repeatedly, from chronic urticaria, which at home becomes pustular and scabbed from scratching, but which shows its true nature in hospital Another still operative cause of familial recurrent pustular dermatitis in children in London is infestation of the home with bugs I have one family under observation which seems to have a very mild form of epidermolysis bullosa, for the mother will wash the children with strong carbolic soap whenever they are sent home from the public assistance hospital, and repeatedly they return *en bloc* in blisters

Recurrent febrile herpes in children is very commonly missed The child presents usually on one cheek a yellow scab made up of a confluence of pustular vesicles The scab is thick, there are no aberrant bullae or scabs on the forehead, or neck, or fingers, the pre-auricular gland is usually enlarged, there is no pain and no œdema of the lower orbit These cases are generally called impetigo, ringworm or lupus, but a history of local recurrence and the complete clearing of the skin between the attacks will help to make the diagnosis clear, until the practitioner has the facility of recognizing these interesting cases at sight They are due to a filter-passing virus infection of the nerve, and a long course of arsenic—for three years—is the most advised therapy

Prurigo appears quite commonly in childhood, but is usually treated for years as eczema before the patient sees a specialist The limbs usually show numerous

reddish, adherent, thin scabs, dry and aggregated here and there into sheets, and having also many isolated discrete red and scratched papules not very much raised above the surface, all the lesions end abruptly with no oedematous pink margin. The skin of the limbs is harsh, thick and dry, frequently the bends of the elbows, the backs of the knees and skin on the upper third of the ulna is purplish and leathery. Regional enlargement of lymphatic glands is sometimes present, but however long the condition has persisted, scarring, cellulitis, lymphangitis or ulceration do not occur. These children are thin, quick and sensitive often there are nervous concomitants, such as nail-biting, teeth-grinding or occasional bed-wetting. Asthma in the family or in the same patient is surprisingly common, occasionally one hears of hay fever or petti- mal in association directly or tamihally. Microscopic examination reveals singularly little change, the signs we see are transient physiological reactions to constant scratching, and on cutting the living skin, edema and congestion which make up the greater part of the lesions disappear at once. This prurigo is essentially a nervous malady, a disorder of sensation. All too easily a "tic" of scratching is established and a divorce of the patient from his skin is essentially the line of treatment that is most helpful.

The limbs should be wrapped up daily in pasta zinc, the fingers bandaged over and the elbows splinted. Two exposures of one-third of an erythema dose of X-rays to all the affected areas of skin will be most helpful. During treatment, washing the limbs is not essential, and as it may stimulate the nerve endings it is better avoided. Here the above stated objection to synthetic ointments does not obtain as sepsis is absent. Linnam in doses of half-a-gram two or three times a day, may be easily administered with very noticeable benefit in

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checking the quick response of the skin to a change in air current, or the touch of clothes that may bring on a spasm of uncontrollable scratching. Cotton or linen next the skin, the avoidance of wanton exposure to strong light and strong soaps are important factors in the after-care of these children. Ambulatory treatment is not likely to be satisfactory for difficult cases, but a combination of rest in bed and shock treatment by auto-hæmo therapy or the intravenous injection of T A B will often put a complete end to this condition after an artificial pyrexia of 103° to 104° F.

The last condition I would refer to as being often missed is lupus disseminatus, immediately after an attack of measles or chicken-pox, or diphtheria, or scarlet fever, a multitude of lesions may appear scattered on the face, trunk and limbs. Each lesion consists of a varying aggregation of small apple-jelly nodules of typical lupus, but, at first sight, owing to a scaling of the surface, psoriasis or ringworm are often suggested as the diagnosis. This cutaneous embolic dissemination of tubercle bacilli from a deep caseous gland is not really rare—it is a grave warning of the care that should always be given to the convalescence after specific fevers. Finsen light to the facial lesions to hasten healing with a beautifully cosmetic scar, and Krohmer light therapy to the body lesions, with the additional help of general light baths, a cure may be expected in a year.

PRACTICAL NOTES

severe cases, however, a quick response is obtained when fat is eliminated from the diet. Complete recovery of normal fat tolerance takes from two years upwards. The best diet has high protein, moderate carbohydrate and very low fat content. Five milligrams of irradiated ergosterol daily by mouth or ultra-violet irradiation (essentially part of the treatment) give vitamin D and avoid rickets changes. Continuous supervision of the regime by practitioner, parents and social service is essential. Even minor infections, such as intercurrent "cold," may cause a sharp relapse in fatty diarrhoea. A complicating secondary anaemia shows a moderate response to liver extract feeding combined with iron. Massage to the limbs and an abdominal support may be necessary. Usually the normal contour is eventually established, but persistence of abdominal protruberance and gluteal atrophy often occurs. The ultimate mental and physical state is very good.—(*Birmingham Medical Review*, 1930, V, No. 3.)

Croup

D M Tolle, from a study of 844 cases of croup, comes to some interesting conclusions. He insists that direct laryngoscopy with culture is indicated in every case of croup, in only 61.6 per cent of cases diagnosed as laryngeal diphtheria was the diagnosis correct. The greatest number of the cases occurred in the first four months of the year, 83.5 per cent occurred during or before the fifth year and 59.9 per cent during or before the third year. In 23 per cent there was no membrane in either the nose or the throat, tracheo-bronchial involvement occurred in 12.2 per cent. With suction, only 19.8 per cent needed intubation, while 41 per cent, without suction, needed intubation, with suction, the mortality in cases in which intubation was performed was 10.6 per cent, while, without suction, the mortality was 41.6 per cent. With suction, there was found to be practically no danger of blocked tubes, and fewer patients developed bronchopneumonia. Patients in whom intubation was performed were found to do better when fed by the nasal route. Diphtheria antitoxin was found to be most advantageous when given intravenously to patients with laryngeal diphtheria. Acute laryngo-tracheo-bronchitis produced a high mortality, it was usually caused by some variety of streptococcus, the haemolytic variety being found most frequently. In this infection there was often a thick, dirty, tenacious secretion which formed obstructing plugs. Intubation, in conjunction with suction to remove plugs, was the most favourable method of treatment.—(*American Journal of Diseases of Children*, vol xxxix, No 5, May, 1930, 944)

Reviews of Books.

A Textbook on the Nursing and Diseases of Sick Children for Nurses and Welfare Workers By various authors Edited by ALAN MONCRIEFF, M D, M R C P London H K Lewis & Co, Ltd, 1930 Demy 8vo, pp xiv and 580, 111 Figs Price 15s

Dedicated to the past, present and future nursing staff of the Hospital for Sick Children, Great Ormond Street, and written by members of the staff of that famous hospital and its sister tutor, this is an excellent work of reference and guidance not only for those for whom it is intended, but also for busy practitioners. The Great Ormond Street Hospital, founded in 1852 by Dr Charles West (1816-98), was the first special hospital for children in this country, and one of its principal objects was the training of nurses, which in those days of "Sarah Gamp," who lived near the hospital, was a very urgent need. There are two parts in this well-written book, the first deals with nursing in several sub divisions, the third of which, on general surgical nursing, begins with a short but clear account of bacteriology, immunity, and inflammation. The second part gives an account of the various diseases of infants and children, and in some special branches of which, such as diseases of the eye, the colleagues of the five main contributors have lent a helping hand. Much attention is rightly paid to diet and methods of treatment, and the result is eminently satisfactory. Nurses entering for the Final State Examination will find this a sure guide and can test their knowledge by the papers reproduced in the appendix.

Recent Advances in Diseases of Children By WILFRID J PEARSON, D S O, M C, D M, F R C P, and W G WYLLIE, M D, M R C P Second Edition, Recent Advances Series London J and A Churchill, 1930 Pp x and 548, plates 20 and 34 text-figures Price 15s

THE success of the Recent Advances Series is shown and shared by one of the largest volumes in the series that on diseases of children by Drs Pearson and Wyllie. The demand for a second edition has given the authors the opportunity of making additions, alterations and corresponding condensations in the text, thus an account of acute disseminated encephalo-myelitis, such as occasionally follows vaccination, measles and other infections, has been added, in this section reference is made to Schilder's disease, or encephalitis periaxialis diffusa, which is supposed to be inflammatory, but the cause of which is unknown. In the description of chorea, which follows as being apparently the result of a sub-acute or chronic meningo-encephalitis, the effects of treatment by nirvanol are critically considered, and the possible bad effects are set out. This chapter on skin tests and some forms of immunization has been recast by Dr A Signy, and the successfully illustrated section on X-rays in diagnosis has again been supervised by Dr Bertram Shires. This volume skilfully combines the uses

THE PRACTITIONER

of a textbook with those of a guide to the most recent knowledge, and the authors must be congratulated on the way in which the new and the old have been correlated into a clear and readable whole. The selected references appended at the ends of the chapters show the dates of the most recent advances and enable the reader to consult the original sources.

Congenital Clubfoot. By E. P. BROCKMAN, M.Ch., F.R.C.S.
Bristol: John Wright & Sons, Ltd., 1930. Demy 8vo., pp.
110. Illustrations 92. Price 10s. 6d.

THIS monograph won for the author the Robert Jones Gold Medal in 1928. The first half is devoted to the history, anatomy and pathology of the deformity, and the second to its etiology and treatment. The work is based on a series of nearly 200 patients at St. Thomas's Hospital, and the author draws interesting conclusions therefrom. He advances a new explanation of the mechanics of talipes, and suggests that it is comparable to congenital dislocation of the hip, inasmuch as the astragalus is partly dislocated from a socket formed normally by scaphoid, inferior calcaneo-scapoid ligament and sustentaculum tali. Treatment during infancy consists in manipulation and retention by adhesive plaster, but an open operation is advised in selected cases over three years of age where manipulation has either failed or has not been carried out; this operation is designed to replace the head of the astragalus in a normal position. Photographs show good results from the operation, but the very short after-history detracts from their value. Mr. Brockman's book bears the stamp of much reading, thought and observation. We commend it to all who treat talipes.

Injuries to Joints. By SIR ROBERT JONES, BART., K.B.E., C.B.
Third ed., Oxford Medical Publications, Humphry Milford,
Oxford University Press, 1930. Foolscap 8vo., pp. 195, Figs. 29.
Price 6s.

ORIGINALLY published as a war book fifteen years ago, the first edition was reprinted three times, and the second edition of 1918 on five occasions, so there is no need to labour the popularity of this authoritative handbook. Its general character has been preserved but with the assistance of Mr. Harry Platt, of Manchester, it has been thoroughly revised and additions made—for example, Volkmann's ischemic paralysis, which is usually seen in supracondylar fractures of the lower end of the humerus in young children, and may be due not only to pressure from without by tight bandaging or splinting but also to pressure from within by a hematoma. The effects of the acute venous block, namely, extensive degeneration, and small-celled infiltration, chiefly of the flexor muscles occur very rapidly, early detection and the prompt measures recommended may entirely prevent or at least minimize this deformity. It is pointed out that some traumatic myositis ossificans after a posterior dislocation of the elbow is more frequent than is generally realized and should receive more attention. The book is full of sound practical advice, the fruit of long experience.

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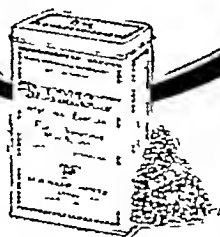
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Assistant Gynaecologists—Dr W. F. T. Haultain, O.B.E., M.C., Dr Douglas Miller Dr E. Chalmers Fahmy.

DEPARTMENT FOR DISEASES OF THE SKIN

Consulting Physician—Sir Norman Walker, LL.D.
Physicians—Dr Fred Gardiner Dr R. Cranston Low.
Assistant Physicians—Dr Robert Aitken Dr G. H. Percival.

OPHTHALMIC DEPARTMENT

Consulting Surgeons—Sir George A. Berry, LL.D., M.P., Dr George Mackay Dr W. G. Sym Dr J. V. Paterson.
Surgeons—Dr A. H. R. Sinclair Dr H. M. Traquair.
Assistant Surgeons—Dr E. H. Cameron, Dr C. W. Graham.

EAR, NOSE AND THROAT DEPARTMENT

Consulting Surgeons—Dr P. McBride, Dr Malcolm Farnhamson, Dr A. Logan Turner, LL.D.
Surgeons—Dr John S. Fraser, Mr J. D. Lithgow.
Assistant Surgeons—Dr W. T. Gardiner, M.L., Dr G. Ewart Martin.

VENEREAL DISEASES DEPARTMENT

Clinical Medical Officer—Mr David Lees, D.S.O.
Assistant Clinical Medical Officer—Mr K. C. L. Batchelor.

DENTAL DEPARTMENT

Consulting Surgeons—Mr Wm Gay Mr J. H. Gibbs.
Surgeons—Mr D. L. G. Radford, Mr R. G. Scott Dow Mr F. G. Gibbs Mr Jas. Northam Mr. H. M. Starrock.
 Mr D. S. Middleton.

RADIOLOGICAL DEPARTMENT

Consulting Radiologists—Dr W. Hope Fowler Dr Arch. McKendrick.
Medical Officer in Charge—Dr J. M. Woodburn Morrison. *Senior Assistant Medical Officer*—Miss E. V. Thomson, F.R.C.R.
Junior Assistant Medical Officer—Dr John S. Fulton.

PATHOLOGICAL DEPARTMENT

Honorary Pathologist—Professor Lorrain-Smith. *Senior Pathologist*—Dr James Davidson. *Pathologist*—Dr W. G. Millar.
Assistant Pathologists—Dr B. Carmichael, Dr Bruce M. Dick, Dr D. M. Dunlop.

BACTERIOLOGICAL DEPARTMENT

Honorary Bacteriologist—Professor T. J. Macle. *Bacteriologist*—Dr W. R. Logan. *Extra Bacteriologist*—The University Senior Assistant to the Professor for the time being.
Senior Assistant Bacteriologist—Dr J. T. Small. *Assistant Bacteriologists*—Dr J. A. Burgess, Dr Douglas Campbell.
SUPERINTENDENT—Col. O. St. C. Thom, C.B., C.M.G., C.B.E., M.B., C.M.

APPOINTMENTS

No fees are charged for any Medical or Surgical appointments in this Hospital which are as follows—
 1. Resident Physicians and Surgeons who must be registered as legally qualified Practitioners are from time to time appointed by the Managers on the recommendation of the Physicians and Surgeons. The holders of these offices live in the house free of charge. The appointment is for six months but may be renewed at the end of that period by special recommendation.
 2. Non-resident House Physicians and Surgeons and Clinical Assistants who must be registered as legally qualified Practitioners, are appointed by the Managers on the recommendation of the Physicians and Surgeons. The appointment is on the same terms as that of the Resident Physicians and Surgeons.
 3. Clerks and Dressers are appointed by the Physicians and Surgeons. These appointments are open to all students and Junior Practitioners holding Hospital Tickets.
 Assistants in the Pathological Department are appointed by the Pathologist.

HENRY MAW Secretary & Treasurer

University of London OPHTHALMIC HOSPITAL MEDICAL SCHOOL

ROYAL LONDON OPHTHALMIC HOSPITAL (Moorfields Eye Hospital) CITY ROAD, E.C.1

Official Medical Practitioners and Registered Medical Students may enter on the Practice of the Royal London Ophthalmic Hospital (Moorfields) at any time and are, on certain conditions, eligible for appointment as Chief Clinical Assistant, Clinical Assistant, and Junior Assistant.

Courses of instruction, extending over a period of five months, begin in OCTOBER and MARCH.

- (1) Practical Refraction Classes. (2) Methods of examination and use of the ophthalmoscope. (3) Lectures every afternoon on the following subjects—
- (a) Anatomy, including Embryology and Normal Histology. (b) Physiology.
- (c) Optics, including Physical Optics. (d) Pathology and Bacteriology.
- (e) Ophthalmic Medicine and Surgery, consisting of Medical Ophthalmology, External Diseases of the Eye, Motor Anomalies and Squint, Diseases of the Retina and Optic Nerve, Diseases of the Uveal Tract. (f) Ophthalmoscopic Conditions. A practical class with demonstrations each week at 5 p.m. (g) Clinical Lectures.
- (h) Occasional Lectures on subjects allied to Ophthalmology. (i) Operative Surgery. In these classes the usual operations are performed by the student upon pig eyes. (j) Practical Pathology. A course of demonstrations on the normal and morbid histology of the eye is given by the pathologist in the laboratory. (k) Practical Bacteriology. (l) Classes in Radiography. (m) Physiotherapy (Ultra Violet Light, Diathermy, &c.) (n) Salt Lamp Microscopy.

FEES: A contribution fee of 15 pence is paid by all students once to all the lectures and classes (except the classes on Physiotherapy, and Salt Lamp Microscopy) and the examination fee.

DIPLOMA IN OPHTHALMIC MEDICINE AND SURGERY AND OTHER DEGREES IN OPHTHALMOLOGY

The above complete curriculum is specially designed to meet the requirements of candidates entering for these examinations.

Fees for the Practice of the Hospital—

Perpetual £5 5 0 Three to six months £2 3 0 Two months £2 2 0 One month £1 1 0

Clinical lectures at 5 p.m. daily. Operations are performed between 11 a.m. and 3 p.m. For further particulars apply to the Secretary to the Medical School of the Royal London Ophthalmic Hospital, City Road, E.C.1, or to the Dean, Charles G. Wilson, D.M.S., M.D., M.C.A., F.R.C.S.

UNIVERSITY OF LONDON, KING'S COLLEGE.

FACULTY OF MEDICAL SCIENCE.

COMPLETE COURSES OF STUDY ARE PROVIDED FOR THE PRELIMINARY AND INTERMEDIATE EXAMINATIONS OF:

UNIVERSITY OF BIRMINGHAM.

FACULTY OF MEDICINE.

(Associated with the General, Queen's, and Special Hospitals for Clinical Teaching.)

THE SESSION OPENS ON MONDAY, OCTOBER 6, 1930

The University grants Degrees in Medicine, Surgery and Public Health, and a Diploma in Public Health, also Degrees and a Diploma in Dental Surgery.

The Courses of Instruction are also adapted to meet the requirements of other Universities and Licensing Bodies

HOSPITAL APPOINTMENTS.

A large number of Resident Hospital appointments in Birmingham and District are open to qualified students of the School

SCHOLARSHIPS, EXHIBITIONS AND PRIZES.

Entrance and other Scholarships and Exhibitions and various Prizes and Medals are awarded annually in the Faculty of Medicine

SCHOOL OF DENTISTRY.

(University of Birmingham and Birmingham Dental Hospital.)

The School of Dentistry, in conjunction with the General and Queen's Hospitals, affords a complete curriculum for the Dental Diplomas and Dental Degrees of the University and all other Licensing Bodies. A Dental Scholarship of the value of £46 17s 6d is offered annually

MEDICAL & DENTAL PRE-REGISTRATION EXAMINATIONS.

The necessary Courses of Instruction in Chemistry and Physics and in Biology may be attended in the University

RESIDENCE FOR UNDERGRADUATES AND OTHER STUDENTS.

There are Halls of Residence for men and for women students. A register of approved lodgings is also kept by the Secretary of the University

For Syllabus and further information apply to—

Prof J C BRASH, M A, M D,
Dean

LONDON HOSPITAL MEDICAL COLLEGE & DENTAL SCHOOL

THE WINTER SESSION will open on WEDNESDAY OCTOBER 1st

The Hospital is the largest in England. There are 532 beds in constant use. Last year, in addition to 11,921 Outpatients, 52,923 attended operations, 7,432 Dental patients, 3,631, Major

THE MEDICAL COLLEGE AND DENTAL SCHOOL is a essentially modern with large laboratories equipped with the latest and most approved appliances.

SCHOLARSHIPS AND FELLOWSHIPS to the value of £1,151 are awarded annually, including four Open Entrance Scholarships to the value of £350 and two Entrance Scholarships open to students of the University of Oxford and Cambridge to the value of £200.

RESEARCH FELLOWS of approximately £12,000 give unrivalled facilities for medical research. Appointments—Over 150 appointments are made annually from Students of the College recently qualified.

SPECIAL COURSES are held for all the University examinations for the Primary and Final School Examinations of the Royal College of Surgeons and for the Membership Examinations of the Royal College of Physicians. Hospital Practitioners—Exceptional opportunities are offered to qualified Practitioners wishing to attend the General Practice or the Practice of the Special Department of the Hospital. Clubs—Golf, Athletic Ground of 13 acres, Students Hotel etc.

For prospectus and particulars apply to the Dean (Dr. George William Watson, M.D., D.Sc., F.R.C.S.) who will be pleased to make arrangements for anyone wishing to see the Medical College and Dental School. Mile End E 1

Royal Westminster Ophthalmic Hospital

(Incorporated by Royal Charter)
(14 beds including 10 rooms for young patients)
BROAD STREET, Holborn, W.C.2
(near Piccadilly Circus Tube Station)

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Qualified Medical Practitioners and Registered Medical Students may join at any time. Special Clinics in Ophthalmology will commence in October.

For prospectus apply to the Dean, Broad Street, Holborn, W.C.2

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FACULTY OF MEDICINE

Prof. R. J. S. C. DOUGLAS, M.A., M.D., B.Sc., M.S.

The University grants Degrees in Medicine (M.B., Ch.B.), M.D., Ch.M.) and in Dental Surgery (D.D.S., M.D.S.). It also grants a Diploma in Dental Surgery (D.D.S.). These are all open to men and women on equal terms. The session 1935-36 begins on October 1. Lectures and laboratory courses are given in the University, whilst clinical instruction is provided in the general and special Hospitals in the city.

Although the teaching is primarily directed towards the requirements of the University, the instruction amply covers those of other examining bodies. A number of medical hospital appointments are open to qualified students of the subject.

Halls of Residence—There are four Halls of Residence, one for men students and three for women students. Scholarships—A number of Entrance Scholarships are open to students wishing to enter the Faculty of Medicine. There are also post-graduate scholarships.

A prospectus of the School containing all necessary details and also particulars of scholarships, may be obtained free from W. M. Gibbons Registrar.

Charing Cross Hospital Medical School

(UNIVERSITY OF LONDON)
WITH WHICH IS AFFILIATED

THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL

SESSIONS COMMENCE OCTOBER AND APRIL
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Conveniently situated in the Strand, London, W.C.2, the Hospital is a member of the University of London. The facilities of Pathology, X-ray, and other departments are of the highest standard. The Hospital is a member of the University of London. The facilities of Pathology, X-ray, and other departments are of the highest standard. The Hospital is a member of the University of London. The facilities of Pathology, X-ray, and other departments are of the highest standard.

Two Scholarships of £100 each are awarded annually to students of the University of London who have obtained first-class honours in the examination for the degree of Bachelor of Medicine. The Hospital is a member of the University of London. The facilities of Pathology, X-ray, and other departments are of the highest standard. The Hospital is a member of the University of London. The facilities of Pathology, X-ray, and other departments are of the highest standard.

For prospectus apply to the Registrar, Charing Cross Hospital, Strand, London, W.C.2. Telephone 2341.

Royal Air Force Medical Service

A limited number of candidates will be selected for commissions as Medical Officers in the Royal Air Force early in September.

CONDITIONS OF APPOINTMENT.

Candidates will be selected after interview by a selection board without competitive examination.

They must be of pure European descent. They must be British Subjects, the sons of British Subjects and registered under the Medical Act.

Selected Candidates will be appointed to Short Service Commissions (for 3 years extendable to 5), and those under 28 years of age at the time of entry will be eligible for subsequent selection to Permanent Commissions, should they be desirous of remaining in the service.

Resident hospital appointments held since qualifying, will, under certain conditions, qualify candidates for antedate of commission, the age on entry to qualify for a Permanent Commission, if necessary, being increased by a period equal to the antedate.

Excellent opportunities exist for clinical professional work, both Medical and Surgical as well as for the study and practice of Hygiene, Pathology, Ophthalmology and other special branches, adequate provision being made for permanent officers to attend Post Graduate courses of study.

OUTFIT ALLOWANCE.

An officer, who has not previously held a commission in H.M. Forces, will receive an outfit allowance of £50 on joining.

PAY, ALLOWANCES, PROMOTION, ETC

The following table shows the current rates of PAY per annum for the various ranks.

IN ADDITION to pay, officers receive quarters, rations and attendance, or are given cash ALLOWANCES in lieu as shown in the table.

MARRIED OFFICERS who have attained the age of 30 YEARS receive either Married Quarters or ALLOWANCES at the MARRIED RATES.

Service.	Rank.	Pay	Allowances. (Home rates)	
			Married	Single.
On entry	Flying Officer	£408	£—	£122
After 2 years on promotion to	Flight Lieut.	441	441	122
Rising by increments after 2 and 4 years to		508	233	122
After 10 years' total service on promotion to	Squadron "Leader	578	236	160
Rising by increments after 2, 4, 6, 8 and 10 years to		849	236	160
By selection to	Wing Commander	934	237	190
Rising by increments after 2 and 4 years to		1,071	237	190
By selection to	Group Captain	1,169	309	251
By selection to	Air Commodore	1,357	365	312
By selection to	Air Vice-Marshal	1,697	429	373

Rates of allowances abroad are fixed in relation to costs in the particular country.

The rates of pay of the Royal Air Force Medical Branch are fixed on an inclusive basis, and the fact that specialist pay and charge pay are not payable as separate emoluments was taken into account when the rates were fixed.

GRATUITIES.

Short Service Officers who complete their full period of service on the active list may be granted gratuity as follows on transfer to the reserve —

After 3 completed years	£350
After 5 completed years	£700

Permanent officers who are allowed to retire voluntarily before qualifying for retired pay may be granted gratuity as follows —

After 10 but less than 15 years' commissioned service	£1,500
With 15 or more than 15 years' commissioned service	£2,500

RETIRED PAY.

The current rates of service retired pay range from £465 a year normally earned after 20 years' service, to £939 10s. 0d., the maximum for which an Air Vice-Marshal is eligible (at current rates).

Rates of retired pay are subject to alteration upwards or downwards within certain limits according to fluctuations in the cost of living.

Full particulars as to the conditions of service are contained in Air Ministry Pamphlet 25 a copy of which together with form of application, can be obtained on application to The Secretary, Air Ministry (D.M.S.), Admiralty House, Kingsway, LONDON, W.C.2.

ROYAL NAVAL MEDICAL SERVICE.

Vacancies Exist for Medical Officers in the Royal Navy.

Candidates will be entered as Short Service Medical Officers and will be considered for transfer to the Permanent Service after 6 months' service. They must be registered under the Medical Acts, and be under thirty years of age on date of entry.

Medical Officers, R.N., are liable to serve in Naval Hospitals or Ships in any part of the world.

Excellent opportunities exist for Clinical professional work, both Medical and Surgical, as well as for Study and Practice of Hygiene, Pathology, Ophthalmology and other specialist branches.

Adequate provision is made for Post-Graduate Study.

OUTFIT ALLOWANCE of £50 is paid on joining

PAY—Pay from, approximately, £450 to £2,325 a year, according to length of service

ALLOWANCES—When in charge of Hospitals and Sick Quarters, 10s and 5s a day

60 Specialists' Allowances of 5s a day

Flag Allowances 5s and 2s 6d a day

N.B.—About a quarter of the total number of Naval Medical Officers are in receipt of the above allowances.

Provision Allowance and Lodging Allowance are paid when victualling and accommodation are not provided. Servant's Allowance is also payable in certain appointments

PROMOTION—To Surgeon Lieutenant-Commander after 6 years' service, to Surgeon Commander after a total of 12 years' service, Promotion to Surgeon Captain, Surgeon Rear-Admiral and Surgeon Vice-Admiral is by selection

Ante-Date of Seniority on Account of Civil Hospital Appointments and Accelerated Promotion can be Gained

RETIREMENT—Gratuities are paid as follows —

Short Service Officers, after 3 years' service	£300
Permanent Officers, after 4 years' service	£400
" " " 8 " "	£1,000
" " " 12 " "	£1,500
" " " 16 " "	£2,250

Rates of Pension range from, approximately, £558 a year, normally earned after about 25 years' service, to £1,112 a year, the maximum earned by a Surgeon Vice-Admiral

Copies of the Regulations and particulars as to Conditions of Service and Emoluments may be obtained on written or personal application to the Medical Director General of the Navy, Queen Anne's Chambers, Tothill Street, London, S W 1

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SPECIAL ANNUAL MEMBERSHIP TERMS FOR
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WINTER SESSION COMMENCES 1st OCTOBER

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and

POST GRADUATE MEDICAL ASSOCIATION,

No. 1 Wimpole Street, London, W.1.

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Intensive Courses in General and Special Branches of Medicine and Surgery, as a rule, at intervals during the year, also Courses in Special Subjects: Dermatology, Ophthalmology, Laryngology, Otology, Diseases of the Heart, Lungs, and Nervous System, Diseases of Children, Gynaecology, Ante-Natal, Obstetric, Urology, and Postal Surgery, Tropical Diseases, Electro-Therapy, and Psychological Medicine. An Evening MRCP course and F.R.C.S. (Edinb.) course is given twice a year (May and October). Full particulars of the Courses and conditions of admission to fully qualified for the London Hospital, a course with the Fellowship of Medicine may be obtained from the Secretary, who will supply a copy of the "Fellowship of Medicine Journal." The Fellowship of Medicine may be taken in a variety of ways, and the conditions of admission are given at the various lectures. The course is open to all who are qualified for admission to the Fellowship of Medicine with the London Hospital. Mayfair, W.1.

ROTUNDA HOSPITAL, DUBLIN.

The Hospital contains a large lecture theatre, and a large number of patients are treated during the year. The Hospital is an excellent place for the study of the various branches of medicine, and the staff are all qualified for the various branches of medicine. The Hospital is a very good place for the study of the various branches of medicine, and the staff are all qualified for the various branches of medicine. The Hospital is a very good place for the study of the various branches of medicine, and the staff are all qualified for the various branches of medicine.

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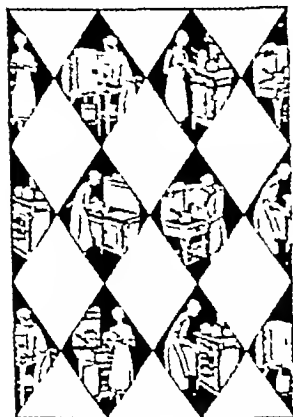
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OF THE UNIVERSITIES OF LONDON, CAMBRIDGE, DURHAM, & AND THE CONJOINT BOARD

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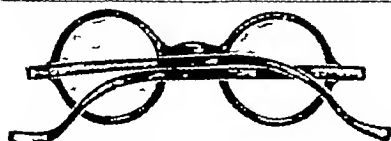
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As a gargle in streptococcal tonsillitis for the treatment of streptococcus carriers in scarlet fever outbreaks.

SKIN CONDITIONS

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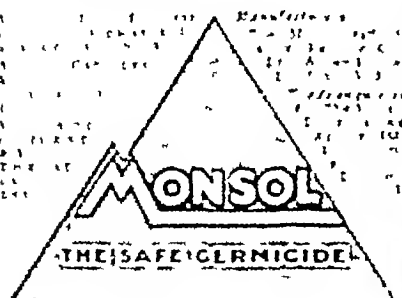
As an immediate prophylactic application or as a dressing for injuries already septic.

OBSTETRICAL PRACTICE.

As a vaginal or intra-uterine douche.

DENTAL SEPSIS

As a mouth-wash after extractions.



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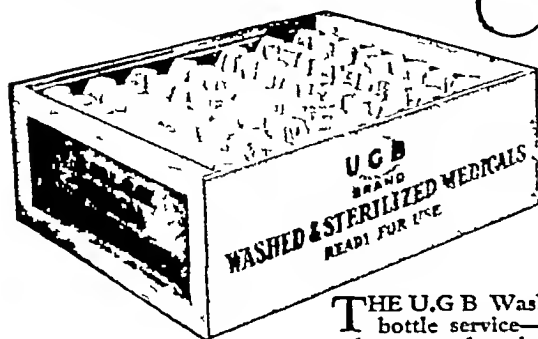
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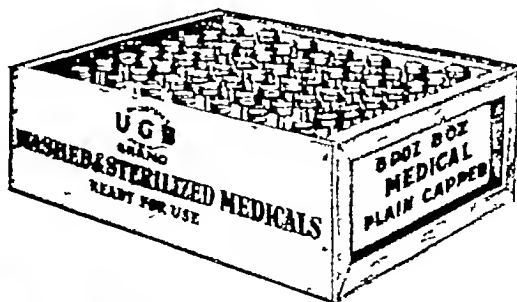
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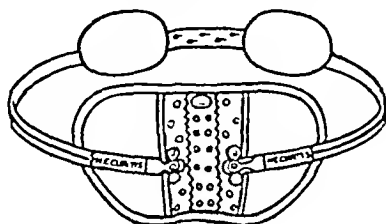
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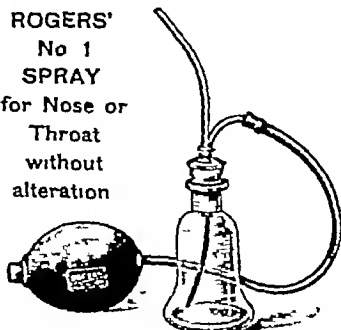
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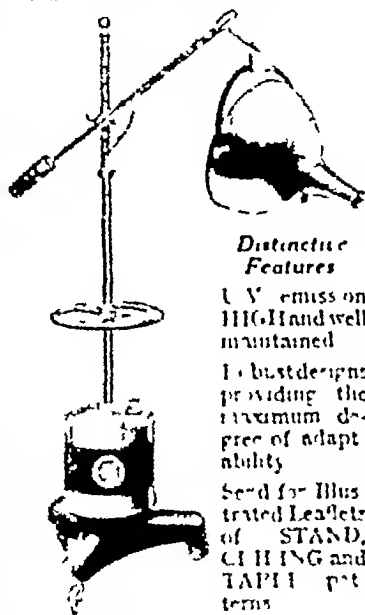
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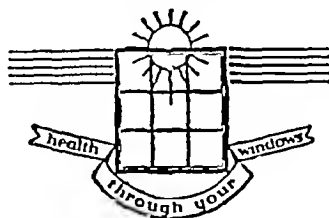
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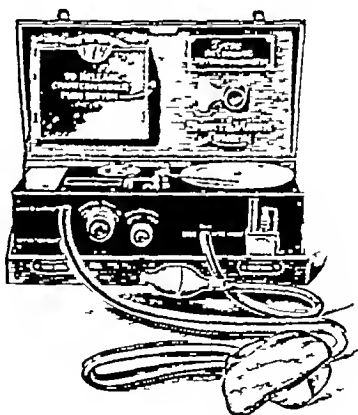
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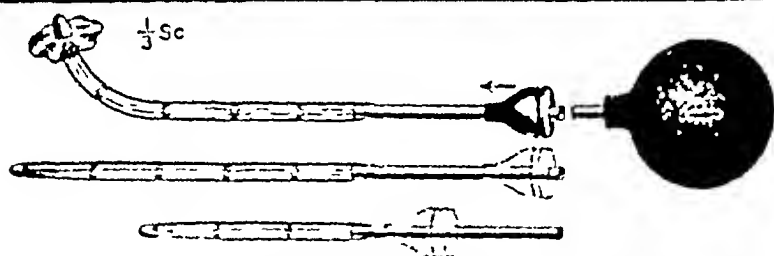
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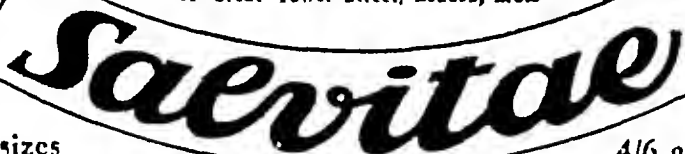


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Q Laboratory Control • Examples such as these illustrate the Glaxo policy of continuous control over every factor in manufacture and also of laboratory and clinical investigation into every problem in infant nutrition In this way the confidence of the medical profession throughout the world has been gained

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A MAN or woman? Adult or child? A very necessary question when you prescribe a remedy for constipation—unless it is Agarol Brand Compound, the original mineral oil and agar-agar emulsion with phenolphthalein. Then you need to give thought only to the dose. And that is simple. Begin with a tablespoonful for adults and a teaspoonful for children, at bedtime. Reduce the dose as improvement takes place.

One tablespoonful at bedtime—is the adult dose

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No excess of mineral oil to make adjustments of the dose necessary. An emulsion as fine as it can be made, that mixes thoroughly with the intestinal contents, carries unabsorbable moisture to them and makes evacuation easy and painless.

Besides, it *gently stimulates* peristalsis, and thereby makes the result certain and re-education of the bowel function possible.

AGAROL *for Constipation*

BRAND COMPOUND

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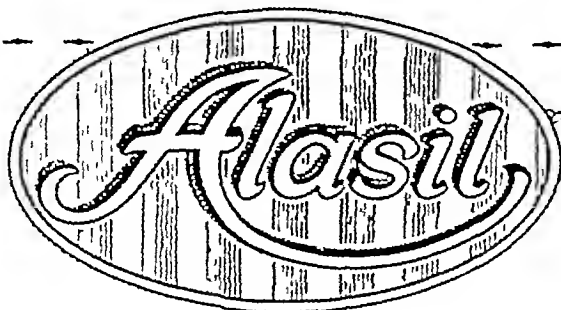
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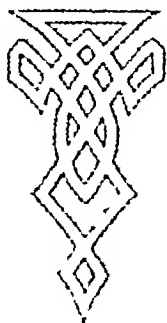
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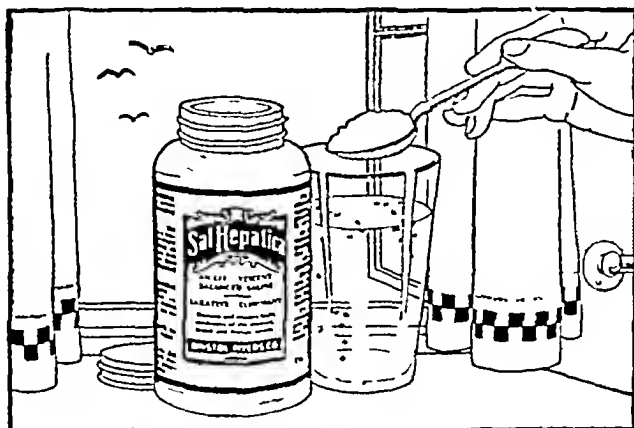


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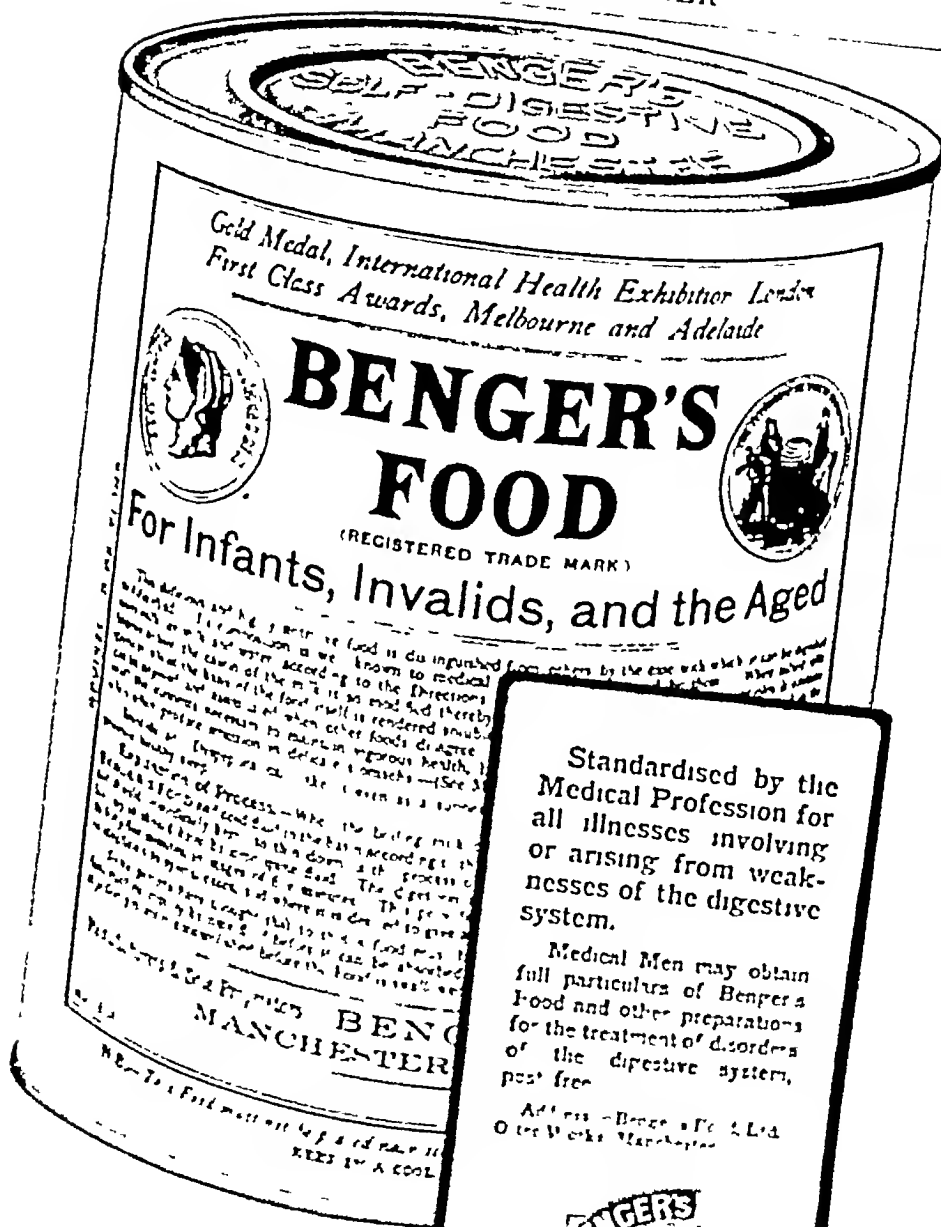
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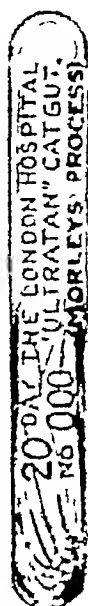
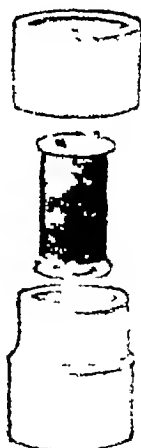
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"An elderly patient had had one breast removed; a glandular swelling appeared in the neck, nothing to be alarmed about, but, on account of what she had just gone through, I had difficulty in persuading her that, as soon as she recovered strength, the swelling would disappear. I do not make a routine practice of advising wine, but here was a case in which it was distinctly indicated, so I ordered Keystone Burgundy. I have never known this woman take anything without complaining—a most difficult woman to treat—and I quite expected her to refuse this after a few doses. Instead she took it well, said it helped her digestion and improved her appetite; evidently lack of gastric tone, and with improved eating the swelling quickly disappeared."

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PROPHYLACTIC inoculation against the common "cold," influenza and catarrhal conditions of the respiratory tract generally, has given a high degree of immunity in a large number of cases

¶ The micro-organisms most commonly found in patients suffering from "colds" are Pneumococcus, Pfeiffer's Bacillus, Micrococcus catarrhalis and Bacillus septus and these are included in the Anti-Catarrh Vaccine prepared in the Department for Therapeutic Inoculation, St Mary's Hospital, London, W, especially for the prophylaxis of colds in adults

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¶ Vaccine treatment of respiratory infections often helps to abort an attack Cold Vaccine (Mixed) is specially prepared for therapeutic use in connection with common "colds" and bronchitis It is suitable for routine use, as its composition has been chosen so as to avoid the necessity of a bacteriological examination

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COLLOSOL
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COLLOSOL
Sulphur
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Possessing advantages
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of sulphur available in thera-
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(A colloidal solution showing
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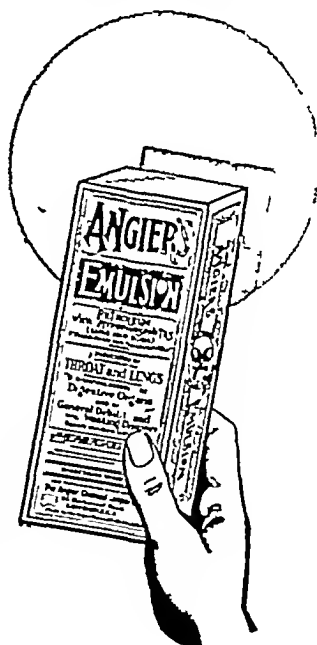
Indicated in acute sub-acute
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it acts as an intestinal antiseptic
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In Intestinal Troubles
incident to the Warm Weather, as
**INFANTILE DIARRHŒA,
GASTRO-ENTERITIS,
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ANGIER'S EMULSION

is particularly indicated. In these conditions it soothes local irritation, and by inhibiting the activity and growth of pathogenic germs, helps to arrest fermentation and putrefaction. Evacuation becomes regular and auto-intoxication is controlled. In diarrhœal conditions, especially of young children, Angier's Emulsion is exceedingly effective. Under its use local inflammation subsides, bacterial activity is arrested, and bowel movements become normal in character and frequency. Either alone or as a vehicle for intestinal antiseptics and astringents, Angier's may be prescribed with every confidence of success.



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Free Samples to the Medical Profession.

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It is supplied in tablets of 7½ gr
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Compound Catarrhal Vaccine In phials containing 235, 470, 940 and 1,880 million organisms per c.c.

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ROBOLFINE contains all essential vitamins — BONE MARROW Yellow marrow from the long bones to stimulate formation of red corpuscles and so strengthen the whole nervous system. Red marrow from the rib bones to stimulate formation of white corpuscles and increase resistance to disease. MALT, a natural laxative and source of energy. EGG YOLK, containing lecithin, the greatest nerve food known. LEMON JUICE, neutralised for building bone and preventing skin trouble.

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'WELLCOME' LIVER EXTRACT is prepared by a process tested and found efficient by the Medical Research Council

Clinical reports continue to present evidence of the prompt response to its administration in pernicious anæmia

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The Prognosis of Coronary Thrombosis.

By BASIL PARSONS-SMITH, M D , F R C P

Physician to the National Hospital for Diseases of the Heart

OF all the numerous causes underlying angina pectoris there is one, coronary artery occlusion, which has been subjected to successful investigation during the past decade. This condition had hitherto been regarded as invariably fatal and, though possibly suspected during the course of the fatal seizure, was, more often than not, an autopsy finding. The whole aspect of the problem has been simplified, for accurate diagnosis can nowadays be made *intra vitam* and, what is even more important, the condition need not of necessity portend a fatal termination. Recovery, partial or complete, from the effects of coronary occlusion may be regarded as a perfectly reasonable possibility and careful analysis of clinical records is essential if we are to formulate any practical scheme of approaching the question of prognosis. That the latter is complex and difficult all authorities are agreed, the reason being to some extent understandable when we realize that coronary thrombosis cases differ very materially in their symptomatology and course, as is clearly shown in the accompanying notes of ten typical cases.

In general terms it is found that from the point of view of prognosis, coronary thrombosis cases may be conveniently grouped as follows —

- (1) Those that are immediately fatal

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(2) Those patients who survive the initial shock and live possibly for a few days with symptoms of rapidly increasing cardiac failure

(3) Those patients who, subsequent to a partial recovery, develop gradual circulatory failure in the course of the following few weeks or months

(4) Those patients who recover sufficiently to resume their normal routine of life and activity

In the present context our concern is chiefly in regard to the last three of these groups and such clinical evidence as may be available for their differentiation. On general principles it will be advisable to consider the question of the patient's age in all cases of coronary occlusion for, though the condition is more especially encountered in late middle life, i.e. from 50 to 70, it is by no means rare in younger people, the average age of the ten cases noted herewith was 61, the youngest of the series being 46, the eldest 76.

It might possibly be expected that the increasingly extensive anastomoses of the coronary vessels which develops in elderly people would to some extent balance the better-preserved recuperative powers of younger patients, but this does not appear to apply in actual practice, all observers being agreed that a more favourable prognosis is to be expected in the younger subjects, largely owing to the fact that their coronary vessels are less likely to be involved by sclerotic and degenerative processes. That the latter play a most important rôle in cases of coronary occlusion is abundantly proved, as is also their tendency to familial distribution. Hence we must be prepared to recognize the factor of heredity whenever we consider the question of prognosis in cases of coronary occlusion. That it is a matter of real and practical importance is amply confirmed by the authoritative writings of Levine,² Bramwell,⁴ Herapath and Perry.³

We may now turn our attention to the condition of

the patient in the early stages of the attack and inquire whether any of the initial symptoms are likely to be of value from the prognostic point of view. The actual severity of the pain does not appear to influence the patient's chances of recovery to any material extent, and it is well to remember that coronary occlusion and cardiac infarction may occur without any pain, as was shown extremely well in a case recorded as early as 1911 by F Parkes Weber.^{*} As a general rule, however, pain when present is significant more by reason of its duration and, if long continued (i.e. for several days) and resistant to treatment, it may in itself be regarded as an unfavourable sign.

Apart, however, from the question of pain, a study of the general circulation following the infarction process may provide useful information. The degree of circulatory incompetence which ushers in the attack should be noted in every case, the rapid onset of congestive failure, hypotension, etc., being viewed with alarm, more especially if they persist or progress in spite of treatment. As a general rule, therefore, we must be prepared to assess the significance and gravity of the initial collapse and all its attendant features. These latter include the following: rapid and possibly irregular heart action, poor quality heart sounds, feeble apex impulse, small and easily compressible pulse, pallor, cyanosis, sweating, jugular engorgement, dyspnoea, with cough and frothy or blood-stained sputum and pulmonary oedema. Such signs are more or less the rule in coronary thrombosis, and one may expect that they will show some evidence of subsiding within 24 hours in favourable cases, should they persist, however, in spite of treatment or intensify, and should they be under any circumstances still in evidence 24 hours after the onset of the attack the outlook is decidedly grave.

Further important evidence is furnished by the blood-

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week. In more serious cases, however, the leucocytosis should, on theoretical grounds, be more persistent, as indicating an extensive involvement of the myocardium but the whole question needs further investigation with a view to accurate assessment of the sign and its possible significance in regard to prognosis.

The temperature chart will be of assistance in a certain number of the cases, patients may be judged to be doing well if the temperature gradually subsides, with relief from the more urgent symptoms during the early stage, i.e. the first three or four days of the illness. As a general rule, however, the outlook is less favourable in those cases showing persistently sustained pyrexia for, quite apart from suggesting an extensive area of infarction, it may very conceivably feature the presence of some condition such as an extension of the thrombosis, embolic developments and intercurrent respiratory infections, any of which might be expected materially to prejudice the course of the disease and the patient's chance of recovery.

There are certain unfortunate complications which may arise without warning in cases of coronary thrombosis, incidentally emphasizing the very precarious nature of the disease and the element of uncertainty which must always be associated with its course and prognosis. These complications include myocardial rupture, secondary embolism and cardiac aneurysm. The first may be regarded as a rare event confined to the early stage of the illness, i.e. roughly, the first two weeks following the infarction. The condition is invariably fatal, and needs no further comment in the present context other than that it should be considered as a possible development signifying excessive tissue destruction and an inefficient process of repair. Equally unforeseen, moreover, is the occurrence of embolic phenomena, secondary to fragmentation of the intramural clot and dissemination into the blood stream of the resulting

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particles The immediate outlook of such a complication will obviously depend upon the actual location of the embolism and, in so far as the latter may originate in either the right or left ventricle, we must be prepared to recognize involvement of the pulmonary as well as of the systemic circuit

The condition may arise at varying intervals following the occlusion, in the majority of cases so far recorded it occurred some time during the second to the sixth week and when we realize that no patient, however satisfactory in other respects, can be regarded as immune from the possibility of secondary embolism, our impression is amply justified that prognosis must invariably be guarded during the first two months following a coronary thrombosis

The third complication, viz cardiac aneurysm, is a possible development in all cases of myocardial infarction, being gradually produced by pressure and friction in the region of the damaged muscle tissue This condition may be suspected in patients who, having survived the early stages of the illness and possibly even recovered sufficiently to resume certain of their former activities, begin to show symptoms of progressive myocardial failure Careful clinical examination and X-ray study may enable a reasonably certain diagnosis in a fair and increasing proportion of cases which otherwise, as heretofore, would have escaped recognition until discovered at autopsy An excellent example of cardiac aneurysm following acute infarction was recently recorded by Scott Pinchin,⁵ the patient being a male, aged 45, in the ambulatory stage following coronary thrombosis two months previously

The above comprise the more important considerations which will need to be assessed when we attempt the difficult task of prognosing coronary occlusion patients Taken collectively they embrace a somewhat formidable list and this, however correctly interpreted,

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must always include reference to the serious complications which may develop without warning during the early stages of the acute illness and the subsequent convalescence

The more noteworthy of the characteristics which may be regarded as definitely favourable in cases of coronary thrombosis may be briefly summarized as follows —

(1) The prompt (i.e. within the first 24 to 48 hours) and sustained relief from pain under treatment

(2) Steady recovery from the initial shock, improvement as regards the peripheral circulation, the gradual disappearance of congestive signs, and the return of a normal venous blood pressure

(3) Improvement in the quality of the heart sounds, restored vigour of the apex impulse and the disappearance of such arrhythmia as may have been precipitated by the infarction

(4) Progressive improvement in the stability of the pulse, relief from anything in the nature of an urgent hypotension, and the establishment of a reasonable level of blood pressure

(5) A briefly sustained temperature becoming normal within the first week, and the gradual disappearance of any such leucocytosis as may be present in the earlier stages of the illness

(6) Well marked serial changes in the electrocardiogram preceding a gradual development of the pre-existing type of curves

The value attaching to the presence of the *a* signs, also, in contrast, their partial or complete absence, was materially exemplified by the patients whose case histories are herewith recorded. In regard, however, to the mortality rate, average expectancy of life, etc., following coronary thrombosis, the group is obviously too small for its analysis to be of any practical value. These questions have, moreover, been fully dealt with

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elsewhere John Parkinson and Bedford⁴ published an important paper on the subject in 1928. In their series of 100 cases 31 had died, 68 were still alive and one could not be traced, of the fatal cases 12 died within a month of the attack, 11 in 1 to 6 months, 7 in 6 to 24 months and 1 after 11½ years. The average duration of life in these 31 cases was six months, of the 68 surviving cases the average duration of life was one year and three months following the attack, and the average survival period for the whole series worked out at slightly under 11 months, which figure, as the authors point out, will be considerably higher when all the cases have been traced to their termination.

Further information on the subject is contained in an excellent monograph by Levine,⁵ who bases his conclusions on the analysis of 143 cases of coronary thrombosis, the immediate mortality rate of the series was approximately 53 per cent, but whether or no this assessment may be accepted as standard is, he suggests, somewhat problematical, for certain types of case obviously cannot be included, viz those patients who die suddenly of unrecognized coronary occlusion and others in whom the condition takes so mild a course that the patients entirely ignore their disability from the medical point of view. The further analysis of Levine's series showed an average life duration of 24 months in those patients who survived the immediate effects of the attack and, in so far as a considerable proportion of these patients were still living, his final conclusion was that the average expectancy of life in recovered cases was a matter of approximately three years.

In the light of the above published conclusions, personal observations, etc., the whole question may be summarized as follows —

- (1) Some 50 to 60 per cent of all coronary thrombosis cases are immediately fatal

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(2) A considerable proportion (about 40 to 50 per cent) of cases survive the acute stage of the cardiac infarction

(3) Recovery following coronary thrombosis may be partial or complete, if partial, the life outlook will probably be a matter of weeks or months, possibly even a year, if, however, complete recovery ensues, the life expectancy of an average case may be estimated at about three to five years

Case 1—J. L., male, aged 62, was admitted to hospital on January 10, 1930, suffering from circulatory failure. The previous history was as follows. Apart from malaria in 1880 and gonorrhoea in 1891 he had had no serious illness, and his general health was always perfectly satisfactory. On December 10, 1929 (a month prior to admission), he had experienced an attack of extremely severe pain in the chest (lower retro sternal region), which persisted in spite of treatment during the following three days, and was associated with extreme collapse. He improved gradually under treatment until January 1 when severe pain (precordial) recurred, with breathlessness, palpitation and feelings of intense exhaustion.

State on admission. Heart enlarged to the right and to the left, the percussion dullness extending $2\frac{1}{2}$ inches to the right of the mid-line in the fourth space and $1\frac{1}{2}$ inches to the left to the region of the feeble apex impulse in the 6th and 7th spaces, sounds toneless, gallop rhythm at the apex, pulse rate 220.

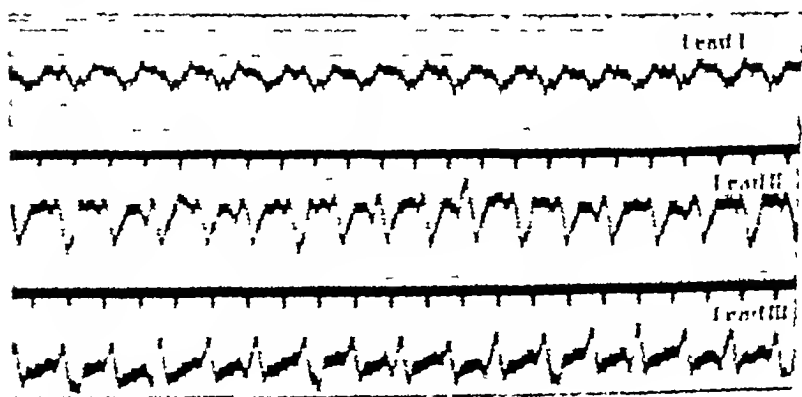


FIG. 1

FIG. 1. ECG tracing of a patient with a recent myocardial infarction. The tracing shows a regular rhythm with a rate of approximately 100 beats per minute. The QRS complexes are small and upright in Lead I, Lead II, and Lead III.

CORONARY THROMBOSIS

mucous membranes, liver enlarged two inches below the costal margin, urine, a cloud of albumen and Fehling's test positive, electrocardiogram (Fig 1) typical of ventricular tachycardia

The response to treatment, which included venesection, oxygen inhalations, morphia, intravenous injections of strophanthin, was not satisfactory, the pain was kept under control, but the signs and symptoms of congestive failure persisted and the ventricular tachycardia continued, on the sixth day, however, there was an abrupt change, the ventricular rate dropped to 80, the temperature returned to normal and patient felt decidedly more comfortable. The curves at this time (Fig 2) showed the presence of complete heart-block. For 24 hours the clinical condition was to some extent relieved, but signs of cardiac failure then recurred, and the patient died on January 19 (nine days after admission to hospital)

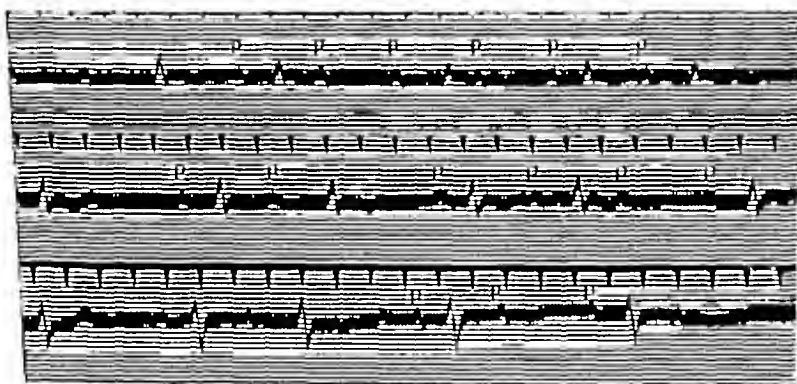


FIG 2

Autopsy findings The anterior aspect of the wall of the left ventricle had an injected appearance, resembling a bruise, extending down to the apex, near the latter there was a small patch of adhesions, the aorta was atheromatous, slightly diminishing the orifice of the left coronary artery, the descending branch of this vessel was filled, just beyond its origin, with soft greyish yellow atheromatous tissue resembling that found in an atheromatous ulcer, from this point down to the bruised area it contained blood clot. Section across the bruised area showed a pale infarct occupying the inner half of the myocardium, with masses of ante-mortem clot adherent to the endocardium in this situation. The valves were normal. The right coronary artery showed gross patchy sclerosis, but was widely patent.

I am indebted to Dr H B Weir for the above summary of post-mortem findings, the parts have been mounted and added to the Museum of the National Heart Hospital

Case 2 — C B, male, aged 62, had a history of " indigestion "

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pains for some years, as a rule associated with exercise and relieved by rest. He had a sudden attack of severe pain in the left side of the chest (præcordial region) on February 5, 1930, associated with circulatory failure (venous congestion, visceral stasis, hypotension, physical collapse, etc.). His condition was regarded as one of coronary thrombosis, large doses of morphia were required to control the pain and he obtained very gradual relief from the urgent symptoms of failure, slight pyrexia (a daily rise to the neighbourhood of 100°) persisting during the subsequent 7 days. The later progress was not satisfactory, the signs of circulatory incompetence showed little material change, being at times intensified by paroxysms of violent coughing, and on one occasion an attack (February 26) of acute pulmonary œdema.

Clinical examination, March 6. Face pale, lips cyanosed, skin moist, expression anxious, pulse rate 112, small volume, easily compressed, regular rhythm, heart enlarged to the left, feeble and diffuse apex impulse in the fifth space 4 inches from the mid line, sounds distant and muffled, soft blowing systolic murmur at the apex, blood-pressure 96 mm. systolic, 74 mm. diastolic, electrocardiogram (Fig. 3) —

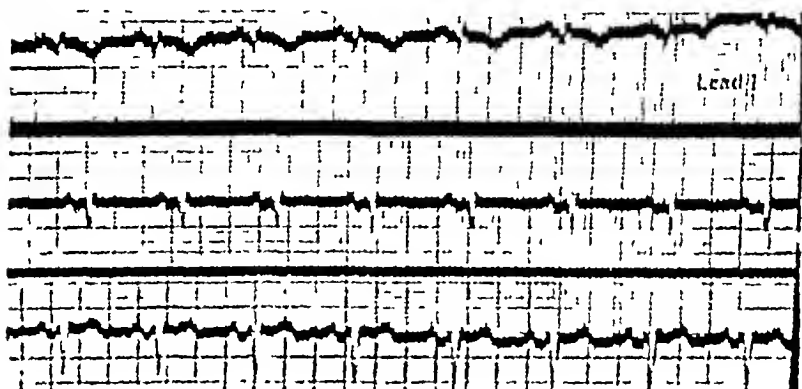


FIG. 3

Low voltage complexes in Leads I and 2. T waves inverted in Lead I, T waves flattened in Lead 2 and S waves exaggerated in depth in Lead 3.

Treatment advised. Complete rest, a simple expectorant mixture for the bronchitis, a hypnotic (medinal preparation) to be taken each evening at bedtime, inhalations of oxygen, camphor (1 c.c. in 1 ounce) should circulatory collapse develop, morphia for the actual pain should it occur, and a moderate venesection in a patient with morphia and atropine poisoning, etc., should there be any further attacks of pulmonary œdema. The response to treatment was unsatisfactory in this case, progressive failure to recover supervened, and the patient died on March 18, six weeks after the onset of the illness.

Case 7.—M. A. male, aged 61; died in Gen. I for years for

CORONARY THROMBOSIS

attacks of palpitation associated with indigestion, he had also the clinical syndrome of a supernormal blood pressure, but otherwise had enjoyed very moderately good health. He had a sudden onset of severe pain in the heart region on September 3, 1929, following a period of physical and mental strain, pain was continuous in spite of treatment, being intensified by movements, coughing or deep breathing, condition complicated by signs of physical and circulatory collapse—breathlessness, cyanosis, tachycardia, vomiting, perspiration, restlessness, etc., the patient in the meantime rapidly developing all the appearances of grave and critical illness.

Examination findings, September 8. Heart size uncertain, there being no definable apex impulse and percussion being impossible owing to the extreme degree of præcordial hyperæsthesia and the general restlessness, sounds distant and toneless at apex and base, no murmur, no pericardial friction sounds, pulse-rate 120, regular but variable in quality and tension from beat to beat, blood-pressure 105 mm systolic and 88 mm diastolic, cyanosis of the lips and engorgement of the cervical veins, bilateral pulmonary œdema. Slight transient relief by morphin, external applications to the præcordium, oxygen inhalations, etc., but signs of circulatory stasis rapidly intensified, the patient gradually sinking, death occurred on September 8 (evening), this being the sixth day of the illness. Autopsy not permitted.

Case 4—W. T., male, aged 60, medical practitioner, had been subject to attacks of oppression in the chest and substernal pain with exertion during the previous three years, in spite of which had continued full professional duty. Woke suddenly one morning with urgent breathlessness and "squeezing sensations" in the left side of the chest, the condition being described as something entirely different from the previous anginal seizures and showing no response to the usual remedies. Seen later in the course of the same day, the patient was still suffering from agonizing pain and his general appearance was typical of profound shock. His face and extremities were pale and cold, profuse perspiration, skin an ashen colour, pulse rate 120, poor volume, easily compressed, blood pressure 84 mm systolic, 60 mm diastolic, apex impulse not palpable, sounds distant, feeble and much obscured by adventitious sounds in the lungs, significant of developing œdema, patient was too collapsed and restless to allow of an electrocardiogram, slight temporary relief under treatment (oxygen inhalations, morphin, and volatile, effem sodium benzoate injections, hot applications, etc.) during the following few hours, but symptoms of asystole were increasingly obvious and fatal syncope occurred later in the evening. Autopsy not obtained.

Case 5—A. J. B., male, aged 50, had a six months' history of effort syndrome following coronary thrombosis in November, 1927. Examination findings, May, 1928. Heart considerably enlarged downwards and to the left, apex impulse in the 6th space six inches from the mid-line, regular rhythm, first sound prolonged at the apex region, second sound relatively accentuated at apex.

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and base, soft systolic murmur at the apex, vessels thickened, blood-pressure 110/90, no gross venous congestion, blood Wassermann negative.

Progress. Patient improved slightly during the early part of June, sufficiently, in fact, to undertake a change to Scotland, climatic conditions were, however, unfavourable and, being somewhat unmoderate in regard to the matter of physical effort, he returned decidedly worse. The subjective symptoms at this time (July) included extreme breathlessness on the least exertion, postural giddiness, cough, flatulent indigestion, insomnia, unpaired mentality, etc., the heart action was feeble and irregular (frequent premature contractions), the pulse was small, the blood pressure was usually about 100, there was definite jugular stasis and oedema of the dependent parts. Apart from slight temporary remissions congestive failure became increasingly severe in this case, and the patient died in October having thus survived his coronary thrombosis by eleven months.

Case 6.—I. P. O., male, aged 76, apart from rheumatism his previous health had been uniformly good. Recurring attacks of angina (usually at night) occurred in January, 1928, and one particularly severe seizure on January 20 which persisted in spite of treatment for six hours was associated with extreme circulatory failure.

Clinical findings. January 22. Heart not enlarged, apex impulse unperceptible, regular rhythm, feeble and toneless sounds at all areas, pulse rate 80, regular, vessels sclerotic and tortuous, blood pressure 110/90, cyanosis of the lips, jugular stasis recurrent, liver edge felt 1½ inches below the costal margin, temperature 100° F., urine analysis negative.

Progress under treatment (absolute rest, morphia sedatives, etc.) was perfectly satisfactory. There was no recurrence of pain after the first week though still a soreness on pressure over the precordial region. Improvement in the quality of the heart sounds took place and there was a definitely palpable apex impulse in the 5th space three inches from the mid line, there was well-marked precordial friction over the lower precordium. The convalescence was uneventful in this case, but in view of the subsequent (July 1928) electro-angiographic findings which included a sharply peaked T wave in lead I, also partial heart block, the patient was advised to lead a quiet and sheltered routine of life in the future. The general condition was well maintained in spite of angina. A further attack occurred in the summer of 1929, the patient took four days in the following year though the circulatory condition improved in one period but the development of a permanent partial heart block occurred.

A further severe attack in May 1930 from the anterior coronary artery produced a fatal infarction. Capillary anemias, especially the pernicious type, during the summer of 1929, the following year and the summer of 1930, of the type associated with a low red blood count and a low haemoglobin level, were treated by the following:

Case 7.—I. P. O., male, aged 61, a retired life insurance agent.

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and hypertension during the previous four years, he was awakened one morning by a particularly severe attack of pain in the chest, which persisted in spite of all the usual remedies, being accompanied moreover by vomiting, extreme restlessness and profound collapse. Examined six hours after the onset of the attack, the patient was found to be cold, semi-conscious and prostrate, heart sounds almost inaudible, frequent premature contractions, pulse-rate 120 and barely perceptible, blood-pressure 84/70, marked cyanosis, venous stasis and Cheyne-Stokes breathing. The circulatory failure was rapidly progressive in this case, the patient dying two hours later.

Case 8—W F, a sturdily built and well-nourished man of 62, whose previous history, apart from malaria and occasional rheumatism, was negative, complained one evening when out walking of a severe tearing pain in the chest. After lasting some hours, the pain was gradually relieved by simple treatment, but early the following morning (May 12, 1930) it recurred with rather more agonizing and alarming intensity.

On examination the findings were as follows. Pulse-rate 100, regular, blood-pressure 140/100, cardiac enlargement suggested by percussion, but accurate measurement impossible, the patient being still extremely restless in spite of having had gr $\frac{1}{2}$ of morphia one hour previously, apex impulse not felt, heart sounds muffled, distant and toneless in quality, soft systolic murmur at apex and base, vessels thickened and tortuous, well-marked jugular stasis and cyanosis of the mucous membranes. Electrocardiogram (Fig 4) showed abnormalities as follows (1) A high take-off of the T waves in Lead 1, (2) low voltage ventricular complexes in Lead 2, (3) notched R waves in Lead 3, and a low take-off of the T waves from the RS complexes.

These latter findings confirmed the diagnosis of acute myocardial infarction and treatment was arranged accordingly, the initial results were encouraging, but temporary in character, congestive failure ensued and proved fatal on the fifth day of the

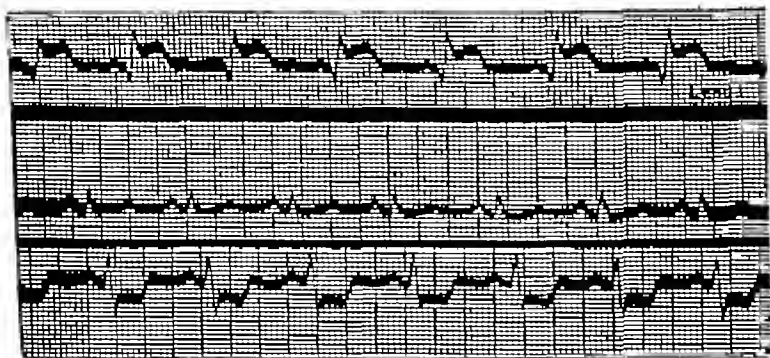


FIG 4.

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illness. Post-mortem examination in this case was unfortunately not permitted.

Case 9—O. T., aged 16, a well developed man of the athletic type, whose previous health had always been excellent, began to suffer from "indigestion pains" in the spring of 1926, which culminated on May 6 in a particularly alarming and prolonged seizure. Six days later the condition recurred—an agonizing pain in the retro-sternal and precordial regions, with a dull, heavy ache in the left arm, the former intensified by breathing movements and frequent attacks of vomiting.

Clinical examination on May 13 revealed the following: General appearance suggestive of grave illness, face pale and cyanotic, expression apprehensive, restless movements continuous, troublesome cough and frequent attacks of retching, area of cardiac dullness normal, apex impulse not felt, rhythm irregular, frequent premature contractions, sounds feeble and toneless, pulse rate 100, frequent intermissions, vessels not thickened, blood pressure 120 mm systolic, 90 mm diastolic, temperature 100° F., pericardial friction over left ventricular area. The condition was obviously one of coronary thrombosis, treatment was arranged accordingly and recovery was uneventful.

Later notes of this case were as follows: June 31—"Is recuperating rapidly, and, apart from slight discomfort in the left side of the chest with sudden changes of position, has no subjective complaint." Apex impulse well defined, rhythm regular, heart sounds normal in intensity, no murmurs, no pericardial friction, blood pressure 130/80. Electrocardiogram: T waves sharply inverted in Leads 1 and 2.

July 26—"Still improving and, except for an occasional reminder of the pain when making sudden movements, is entirely free from symptom." Heart action, pulse, blood pressure, etc., all within normal limits. Electrocardiogram: T waves inverted in Lead 1 but positive in Lead 2.

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subsided

Gradual improvement was maintained subsequently, on the seventh day (March 22) the temperature was normal, the pulse quiet and regular, the peripheral circulation efficient, and the patient's sole complaint was of tenderness in the left side of the chest on pressure or movement, the leucocyte count was found to be 7,000 (68 per cent polymorphonuclear cells)

During the following few weeks the illness appeared to be proceeding in a perfectly satisfactory and uncomplicated fashion, so that a favourable outlook was anticipated, in the sixth week, however, a sudden cerebral seizure occurred (unconsciousness, hemiplegia, etc.)—the outcome, no doubt, of a cerebral embolism, and the patient rapidly succumbed without regaining consciousness. No autopsy was permitted in this case

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ligatures are passed under each, as near the aorta as possible. A small plug of cotton wool is placed in the opening of the coronary sinus to prevent any of the mass finding its way accidentally into the venous system.

The actual injection presents no difficulties. Pressure is raised in the receptacle by means of the hand pump until the mass begins to escape from the cannula. The pressure tubing is immediately clamped. By this means all air bubbles are displaced from the tubing. The cannula is passed down the aorta and into the opening of a coronary artery. It is fixed in this position by tying the first ligature. The pressure in the receptacle is raised to 200 mm. and the pinch-cock is released. The superficial branches may be seen filling immediately. The pressure is raised at once to 240 mm., and maintained for four minutes. The tubing is re-clamped, and the second ligature is tied. The pressure in the apparatus is reduced by means of the suction screw of the pump. The process is repeated on the other coronary. The heart is packed with wool and kept in formalin for 24 hours before being radiographed. It is returned to formalin for a further four days before the septum is dissected out and radiographed.

As the findings in my investigation agree in the main with those of Gross², it is not proposed to describe at this juncture the normal anatomy (Figs. 2 and 3), anastomoses and age changes in the coronary arteries. In passing it is interesting to note (1) that in 5 per cent. of hearts the left coronary artery is the sole supply of the neuromuscular tissue, (2) that 11 per cent. of all hearts possess three coronaries, and the accessory vessel is more commonly found on the right in the proportion of 8:1. These facts have not been hitherto mentioned in the literature.

It is clear that obstructive lesions of the coronary

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FIG 2—The normal coronary arterial system of an adult aged 45. The right coronary artery is to the left of the figure as in all the figures that follow. Note (1) The position of the S A node (2) The artery to the S A node arising from the right coronary (3) The crux (4) The posterior descending branch of the right coronary in the interventricular groove (5) The right marginal branch (6) The branch in the moderator band (7) The left anterior descending artery

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if associated with calcification, will give a shadow, which is quite different from that cast by a normal injected vessel. If occlusion is incomplete, an attenuated indefinite shadow is seen, and this offers a marked contrast to the smooth, even outline of the unaffected vessels. A thrombus in the process of canalization has a characteristic appearance. The affected vessel has an irregular and indefinite outline, appears double in parts, and the shadows are continually overlapping. If a considerable time has elapsed between the time of occlusion and the death of the patient, it is probable that many anastomotic channels will have opened, so that the area of myocardium supplied by the occluded artery may contain injected vessels.

CLINICAL CASES.

Case 1—The patient, W. G., a railway clerk, aged 55, was admitted to hospital, having collapsed in the street. As he was walking after lunch he suddenly felt faint and was seized with severe pain and tightness in the precordium. He collapsed and became unconscious. There was nothing relevant in the past history, and he had had no previous "anginal" attacks.

On admission, he was cyanosed and very dyspnoic. The pulse was weak and regular, 60 per minute. Temperature, 96° F. The apex beat was in the fifth intercostal space and 1½ inches to the left of the middle line. The heart sounds were very faint and the blood pressure was 85/75 mm. There were moist sounds in the bases of both lungs, and there was a moderate albuminuria. On the next day his general condition improved and the pulse rate rose to 100 while the temperature remained subnormal. The liver was enlarged three inches beyond the costal margin, and the amount of urine was diminished. The pain had almost disappeared and the dyspnoea was the predominant feature. On the following day the dyspnoea was much worse and the moist sounds in the lungs were much more increased. The oliguria was very pronounced and the red corpuscular content of the blood rose to 60 million per cent. The patient died that evening.

At the autopsy a part of the yellow fluid was found in each pleural cavity. The air passages and the lungs were congested. The liver weighed 700 gms. and showed early nutmeg changes. The kidneys were congested but there was no evidence of chronic nephritis. The heart weighed 170 gms. and the left ventricle was a little hypertrophied. The left ventricle from the base to the apex contained laterally, one of a yellowish-brown color with areas of small, brown spots on section. The posterior

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diately under the pericardium was not affected to the same extent as the deeper part of the muscle. There was no intracardiac thrombosis. The remainder of the heart was normal. The aorta and the coronary arteries showed many atheromatous areas, and there was a thrombus in the left anterior descending artery, which apparently closed its lumen. Unfortunately, it was impossible to obtain the heart for injection owing to medico-legal difficulties.



FIG 4—Photomicrograph of the thrombosed artery $\times 50$ Organizing thrombus and canalization

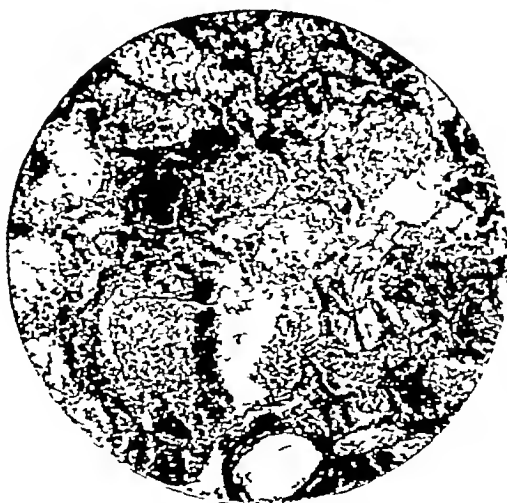


FIG 5—Photomicrograph of the lung $\times 55$ Intense congestion and edema are shown. Many catarrhal cells are present in the alveoli

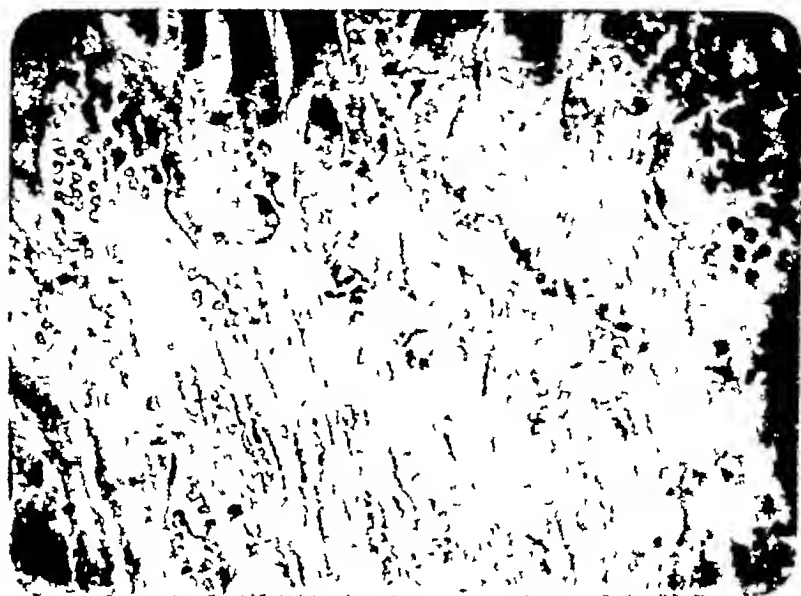


FIG. 6.—Photomicrograph of the present infant. $\times 750$. Section taken through the margin of the infarct. Note the polymorphonuclear infiltration and the extravasation of the erythrocytes. The muscle fibres are swollen and granular, and the striations are absent. There is almost complete loss of nuclei at margin.

Microscopically the left coronary artery showed an organizing thrombus, with evidence of calcification, the lumen was almost completely occluded. The left ventricle showed well marked fibrosis, and in one portion there was myofibrillar cordis. The muscle fibres were swollen and oedematous, appearing as if they contained coarse granules in their substance. The striations were not visible, and the nuclei did not stain at all in some areas, while in other areas they appeared small and shrunken. There was marked extravasation of erythrocytes and numerous small areas of polymorphonuclear leucocyte infiltration. The lungs showed intense oedema and congestion, many capillary and heart failure cells were present in the alveoli (Figs. 5 and 6).

Case 2.—A 14-hourer, W. C., aged 52, was admitted with a history of sudden pain in the precordial and marked dyspnoea for a few hours duration. History of chest pain similar to that previously given. The pulse was rapid and regular, and the temperature normal. The wall of the ventricle was palpable and he had a loud second heart sound. The apex of the heart was much elevated and the left ventricle was displaced upwards. The apex of the heart was palpable and the dyspnoea was marked. There was no evidence of pulmonary embolism or of any other cause of the symptoms.

At the autopsy the following facts were noted:—The heart was

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there was marked hypertrophy of the left ventricle. There was no recent infarction, but there was a large area of fibrosis in the anterior portion of the septum and in the adjacent portion of the

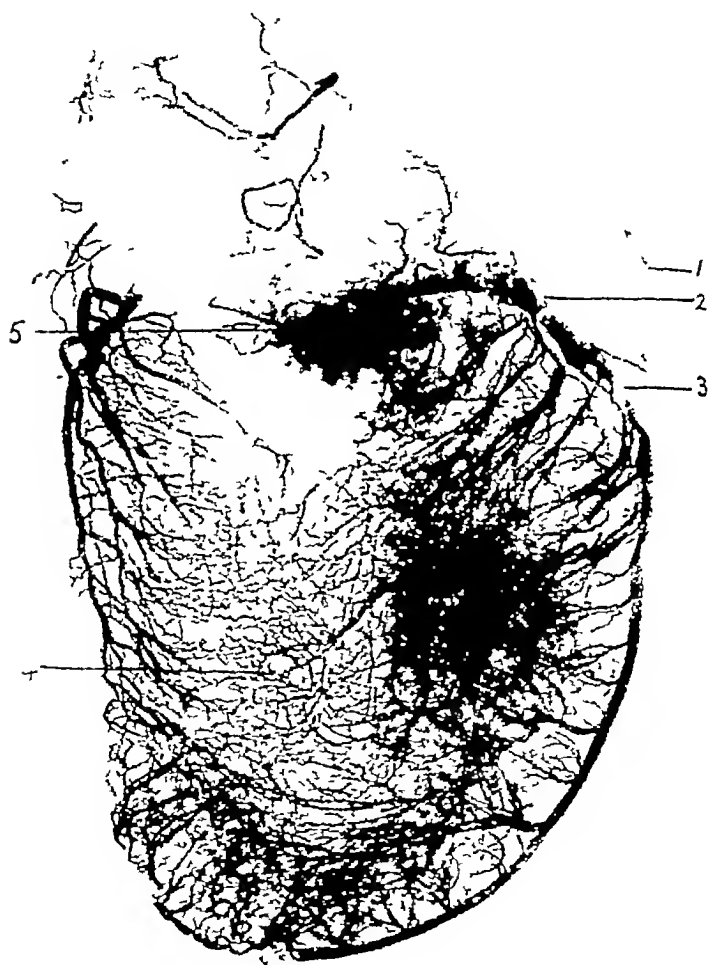


FIG 7 —Septum of a case of almost complete occlusion of the left coronary artery due to atheroma and superimposed thrombosis (1) Vessel in the adventitia of the pulmonary artery (2) Advanced sclerosis and calcification. (3) Almost complete obliteration of the lumen (4) Very close anastomotic network in the septum (5) Kugel's artery and the calcified aortic valves

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left ventricle anteriorly. The aortic cusps were thickened and the other valves were normal. All other organs were acutely congested and there was evidence of chronic interstitial nephritis.

The radiogram of the injected coronary arteries revealed advanced coronary sclerosis and calcification of the first $2\frac{1}{2}$ inches of the left anterior descending artery, with almost complete occlusion of its lumen. The septal anastomosis formed an exceptionally close network. The opacity of the anterior portion of the septum is probably due to the dense fibrous scar. (Fig. 7.)

Microscopically, an old standing thrombus superimposed on an area of atheroma and calcification was found. The thrombus was organized, and many of the arterioles close to the main vessel were completely occluded by thrombosis and had become fibrous cords. There was no recent thrombosis. There was dense fibrosis, with small areas of lymphocytic infiltration in the septum and the left ventricle. In many areas the muscle was completely replaced by fibrous tissue. (Fig. 8.)

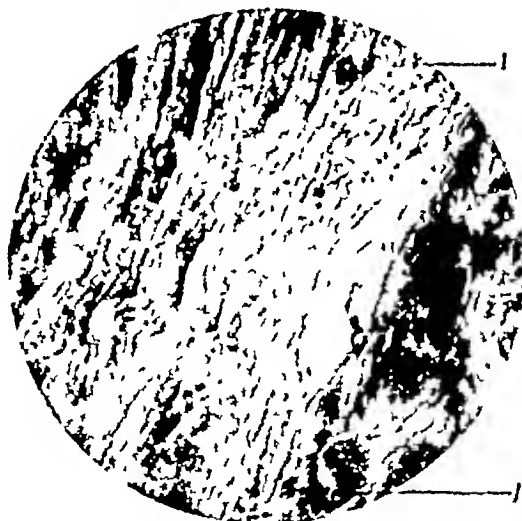


FIG. 8. Photomicrograph of wall of infarct. $\times 55$. The dense fibrous scar and a few small infarcts at the periphery are shown. (1) A number of injected vessels are visible.

Case 3.—The patient, T. T., a musician, aged 52, was admitted to hospital complaining of intermittent pain in the left hypochondrium for three years. There was evidence of marked loss of weight. The face was blanched and the clinical picture was highly suggestive of pyloric stenosis. Examination of the blood confirmed this diagnosis. There was no clinical or serological evidence of syphilis and at no time during the illness did the blood platelets contain a fibrinogen reaction. Just before death, the pain in the left hypochondrium became much more marked. The heart was normal throughout the illness.

At the autopsy, there was marked peritonitis, and the spleen

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showed areas of old and recent infarction. The splenic artery contained a recent thrombus $1\frac{1}{2}$ inches long. The liver showed areas of diffuse necrosis. The heart was somewhat enlarged, and the subpericardial fat was increased. The left ventricle was slightly hypertrophied, and the myocardium and the valves were normal.

The right accessory coronary artery was injected first and its branches anastomosed freely with the anterior descending branch



FIG 9—Right accessory coronary artery and coronary thrombosis
(1) Opening of the accessory vessel. (2) Artery cut at the autopsy
(3) Lower level of the thrombosis (4) Anastomotic channels

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of the left coronary, which was filled up to a point two inches from its orifice. The septal and the ventricular branches were filled from the small accessory vessel. The injection was then completed in the usual way. The right coronary artery contained a canalized thrombus while the lumen of the left anterior descend-



FIG. 10.—The heart of a patient who died of a coronary artery disease. (A) The left coronary artery. (B) The right coronary artery. (C) The left coronary artery, showing the septal and ventricular branches. (D) The right coronary artery, showing the septal and ventricular branches. (E) The left coronary artery, showing the septal and ventricular branches. (F) The right coronary artery, showing the septal and ventricular branches.

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ing vessel for the first two inches of its course was almost completely occluded by thrombosis (Figs 9, 10, 11) The radiological diagnosis was confirmed microscopically There was no evidence



FIG 11—Septum of the heart Note (1) The occlusion of the left anterior descending branch. (2) Large septal vessel arising from the commencement of the right coronary artery—a unique occurrence (3) Wide anastomotic channels

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of coronary sclerosis

COMMENTS

It will be noted that three cases are in males between the ages of 50 and 60, and this is in accordance with the usual findings. It is interesting to note that in the first case there was complete absence of symptoms suggesting coronary artery disease until the onset of the final catastrophe. The severe pain disappeared with the onset of the cardiac failure of the congestive type. The low blood-pressure is a common occurrence and is the explanation of the oliguria. The pericardial rub is frequently absent, as in this case, but when present, it is diagnostic of infarction. This is the type of case that was first recognized by the earlier writers, who for a time did not clearly differentiate the condition from angina pectoris.

The second case conforms more or less to the unusual type described by Wearn,¹² where all the signs and symptoms of acute coronary thrombosis occur in cases with marked narrowing of the lumen of the coronary arteries without recent thrombosis. It illustrates the end result of infarction with recovery from an attack, and the profuse septal anastomosis developed as a result of partial or complete occlusion of a main branch. Finally, it serves to emphasize the predisposition of such a case to further sudden coronary upsets.

In the last case, coronary thrombosis occurred very gradually, and there was adequate time for the establishment of an efficient collateral circulation. The radiogram of the canalized thrombosis of the right coronary artery, complete occlusion of the left coronary, the presence of an accessory coronary artery and the absence of underlying sclerosis make it a case of unusual interest.

The following considerations may explain to a certain extent the varying manifestations of coronary

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thrombosis —

(1) *Site of occlusion* —The occlusion of the artery to the auriculo-ventricular node is a much more serious lesion than the occlusion of a branch of a similar size on the lateral aspect of the left ventricle

(2) *Size of vessel occluded* —The larger the artery occluded, the greater is the liability to intracardiac thrombosis, aneurysm and rupture

(3) *Age and anastomosis* —Coronary anastomosis becomes much more extensive with increasing age. It is clear therefore that the coronary system of persons over 50 may be capable of adjusting itself rapidly to any sudden vascular alterations

(4) *Rate of occlusion* —Compensatory anastomosis is well developed when the rate of occlusion has been slow, and the myocardium is normal in those cases where occlusion has been very gradual

(5) *Blood pressure* —Low blood pressure tends to delay the opening of new anastomotic channels

(6) *Condition of the myocardium* —The presence of chronic interstitial myocarditis is a common occurrence prior to infarction, and it is due to the coronary sclerosis which existed prior to the final occlusion. The presence of fibrosis is serious in that the finer arterioles are obliterated, and thereby the anastomosis is much diminished (Fig. 12).

(7) *Canalization*.—Canalization of the thrombus will assist to a certain extent in re-establishing the blood supply.

SUMMARY

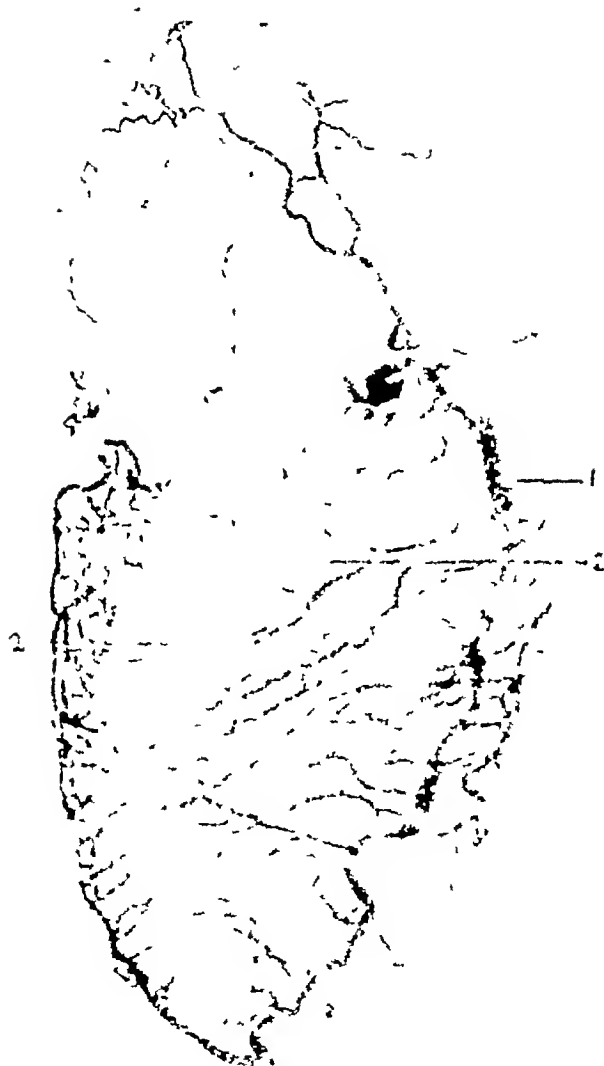
Technique —A simple and reliable standard method of injection of the coronary arteries has been described

Pathological findings —

(1) Coronary thrombosis is usually superimposed on coronary sclerosis (Cases 1 and 2)

(2) Symptoms and signs of acute coronary throm-

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(2) There is no interference with the Theatricals' interest in due to their not being able to sue anyone, all suits are and in the are are listed.

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bosis may occur where there is marked constriction of the lumen of one of the main trunks, without recent thrombosis (Case 2)

(3) Coronary thrombosis may occur idiopathically, and in complete absence of the usual symptoms, the condition being found at the autopsy (Case 3)

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Angina Pectoris.

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ANGINA pectoris may be defined as a disturbance of the cardio-vascular system, in which there is a paroxysmal attack of pain, sub-sternal rather than præcordial, and generally associated with the sense of fear and of imminent death, and with disturbance of respiration.

History.—With regard to the history of angina pectoris, it was known at the time of Hippocrates, but the name was first used in 1768 by Heberden in a paper entitled “Some Account of a Disorder of the Breast.” It was, however, Edward Jenner, of vaccination fame, who first threw light on the nature of this disease, for he was the first one who associated angina pectoris with coronary artery disease. The pathology, however, has remained very obscured until comparatively recent times, when the late Sir Clifford Allbutt and the late Sir James Mackenzie threw much light on the subject. I will deal more fully with the pathology later.

Etiology.—*Age.* The commonest age for angina to occur is between 45 and 65 years, but angina is by no means unknown in children, for about twenty-five cases have been collected in the literature. The syphilitic cases occur between 40 and 50 years as a rule. *Sex.* Angina is much more common in males, in the proportion of about 6 to 1, but in the next generation we shall probably find it more common in women than it is to-day, since women are now entering more into the stress and strain of business life. *Heredity.* This is indirectly a cause, as high blood pressure and arterial

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degeneration sometimes run in families, so that we sometimes find angina in members of the same family
Station of life The disease is more common in the upper classes, and attacks those subject to mental wear and tear from overwork, worry, and anxiety The type of man who develops angina is he who has put all his life into his work, the hyper-conscientious brain worker who has had a lot of responsibility

The immediate exciting causes of angina are —
Exertion The commonest form is walking uphill, and rushing to catch a train or tram
Emotion Such as excitement Hunter used to say his life was in the hands of any rascal that chose to worry him
Flatulence may produce angina, particularly exertion after a meal
Chill As going into a cold room, or walking against a cold wind

Symptoms —Angina is one of the few diseases of the chest which can generally be diagnosed by the symptoms alone without examining the patient, or even feeling his pulse, for examination of an angina patient between an attack may not reveal anything wrong with his heart, blood vessels, or blood pressure The symptoms, however, are very characteristic, and the patient should describe an attack to you without interruption, and you should particularly notice the expression on his face as he describes an attack

The three cardiac symptoms are —(1) Pain, (2) *angor animi*, or fear of death, (3) disturbance of respiration The pain is described by the patient as a crushing, unbearable, agonizing pain, and is like a vice around the chest, and the patient feels as if his sternum was being pressed back to the spine It is associated with a sense of constriction It is crescendo in type and may last a few seconds or minutes The site of the pain is generally beneath the upper part of the sternum, and the patient will generally put his hand there when asked

to point out where he felt the pain. Præcordial pain is very uncommon in true angina. The pain may radiate down the left arm, generally along the inner side, corresponding to the eighth cervical and first dorsal nerves. Sometimes it radiates down both arms. It may occasionally radiate to the neck or occiput, and even to the jaw or teeth. Occasionally the pain begins in unusual situations: it may start in the epigastric region, resembling an abdominal disease, but it then generally spreads upwards over the sternum. This is known as *angina abdominis*. In other cases, it might start in the neck, chin, front teeth, or other unusual situation, but the history is the most important guide in diagnosis, as the pain comes on after exertion.

Associated with the pain is the fear of impending death. The patient feels as if he is dying and that nothing can save him. This is depicted by the terror-stricken appearance of his face. Sometimes this fear occurs without pain, and is known as *angina sine dolore*.

When an attack occurs, the patient if in motion stops still and for the moment holds his breath, and when he breathes again, it is in short, sharp grunts, as if he is afraid to expand his chest, lest the pain might increase. There is, however, no dyspnoea.

Signs.—With regard to the signs during an attack, there may be little except the characteristic immobility and expression of the face, which is pale and anguished, or with an expression of intense anxiety. There may be a clammy sweat, the pulse may be unchanged, the heart sounds normal, and the blood pressure may be normal, although it is often increased. The attack generally passes off gradually, with belching up of wind or the passage of a large amount of pale urine. After an attack, the patient may feel exhausted for some days.

This is a description of a fully developed attack of *angina pectoris*, but one finds that these patients have

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often had premonitory symptoms before a major attack, and therefore to be of value to your patients, you ought to be able to recognize these premonitory symptoms, or angina minor as it is called, then by appropriate treatment you will be able to prevent the major attacks

These patients will often come complaining of indigestion. They feel that if they could "bring up wind," they would be well. If they are asked, however, where they feel the discomfort, they will point to the centre of the chest, about the mid-sternal region, and if you inquire into the cause of it, you will find the discomfort comes on after exertion, particularly walking after a heavy meal. Even in these mild attacks, there is a tendency towards immobility, i.e. the patient must stand still for a few moments until the discomfort goes.

These attacks, if neglected, may be followed by angina major, so it is important to recognize these cases and to view with suspicion any attack of indigestion which is brought on by effort or by going out into the cold.

Mode of Death —About one-third of angina cases die in an attack. In some cases the patient dies in his first attack, while others may survive many attacks. In those dying in an attack, the cause is fibrillation of the ventricle. In those having several attacks, the heart grows weaker and the patient dies from asthenia. In other cases, heart failure supervenes.

Pathology —In some cases that have died from angina, surprisingly little may be found to account for the condition. The commonest pathological changes are narrowing or occlusion of the coronary arteries by arterio-sclerosis, calcification, or syphilitic endarteritis. The next most common lesion is disease of the aorta, as aortitis, arterio-sclerosis, aneurysm or rupture. Other structural lesions are fatty and fibroid

degeneration of the heart, adherent pericardium and arterial disease. With regard to valvular disease, aortic disease is frequently associated with angina, whilst mitral disease is rarely so.

With regard to the explanation of the attacks of angina, the theories which have been advanced are numerous. I shall mention three main views.

(1) The late Sir Clifford Allbutt¹ drew attention to the frequent association of aortic disease with angina pectoris, and ascribed the pain to the increased tension in the first part of the aorta, especially the outer coat, in which there are sensory nerves regulating blood pressure. The heart and coronary arteries had nothing to do with the pain, but with the cause of death, and sudden death was due to vagal inhibition. This is supported by the similarity of the pain in acute aortitis, that the distribution of the pain is not cardiac, but aortic, and that coronary thrombosis produces different symptoms to angina pectoris.

(2) Reid² elaborated Allbutt's theory and said that angina was due to failure of the vaso-motor mechanism of the peripheral arteries, for during effort there is supposed to be lowering of the diastolic pressure and dilatation of the peripheral vessels, thus lessening the pressure of the aorta. Sir James Mackenzie,³ however, ascribed the angina as a symptom of cardiac muscle exhaustion, with increased susceptibility of the central nervous system. The muscle exhaustion was generally due to disease of the coronary arteries.

(3) Danicopolu⁴ has connected Mackenzie's theory of myocardial exhaustion with disease of the coronary vessels, and according to him the pain is due to inadequacy of the coronary circulation, the heart not receiving sufficient amount of blood for its needs at the time. As a result of the deficient amount of blood there is an accumulation of toxin or fatigue product, which

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stimulated the sensory nerve endings in the heart. This view is supported by an analogous condition known as intermittent claudication, in which there is disease of the arteries of the lower limbs, resulting in a deficient circulation to the limbs. The patient is able to walk a limited distance in comfort, but if he continues walking, he gets violent cramp-like pains in his legs, due to inadequacy of the circulation.

To sum up, then, the pain is really of a physiological nature, being due to an inadequate supply of blood through the coronary vessels to the heart, which does not receive the extra amount of blood for its needs on effort. This might occur in a healthy heart, if it is subjected to severe exertion, or there might be an underlying pathological lesion, the commonest being disease of the coronary arteries, or in other cases, it may be due to disease of the aorta, for in atheroma of the aorta the orifices of the coronary arteries are often obstructed, thus interfering with the amount of blood passing through them. Even in simple aortitis, there is loss of the elastic recoil of the aorta, which is necessary to pump the blood through the coronary arteries, for the latter are supplied with blood during diastole. As a result of a deficient amount of blood going to the heart there is shortage of oxygen or anoxæmia of the myocardium, and this factor might be the actual cause of the pain.

Differential Diagnosis —A typical attack of angina pectoris should rarely be difficult to diagnose, the chief points being the paroxysmal type of pain, coming on generally during or after exertion, the character and distribution of the pain, the sense of impending death and cessation of respiration, and immobility during an attack, there is no dyspnoea. One should first exclude such pains due to pleurisy, fibrositis, pleurodynia, neuritis. These pains are not paroxysmal, nor brought on by exertion, but are affected by respiration.

reducing the high blood-pressure. With regard to angina minor, the prognosis depends on early diagnosis with prompt and skilful treatment, otherwise the prognosis is just as serious as the major form.

Treatment —One must first of all make sure one is dealing with primary angina, and not with one of the secondary forms, due to tobacco, infection and other causes. The treatment of primary angina consists of the treatment of heart failure. The future life of the patient must be readjusted, so that he can live within the capacity of his heart. The patient should first be ordered to bed for a complete rest, and his daily life thoroughly investigated. While in bed, a detailed examination of all his organs should be made, such as the condition of the kidneys, his Wassermann taken, and blood-pressure investigated, and appropriate treatment prescribed. If syphilitic, arsenical injections should be given with mercury and iodide. If the blood-pressure be high, it should be treated with calomel and salines, and potassium iodide or collosol iodine, drachms 1 to 2, three times a day, may be given. The amount of rest will depend upon the degree of the heart's failure, some will have to be confined to bed for several months, whilst others may be allowed up after a few weeks, and permitted gradually to do some work. The amount of exercise a person may do will depend on his freedom from pain, for exercise is good for the heart if there are no symptoms of discomfort. Go into the detail of the daily routine of your patient, so that you can eliminate any unnecessary work or worry. Starting at the beginning of the day, the room should be warmed and the windows closed while the patient gets out of bed to dress, because cold may bring on an attack. Similarly, when he goes to wash or to the lavatory, the rooms ought to be heated. He should not go out in very cold weather. He should be avoided, no hurrying to catch train, nor heavy attacks

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carried Walking against the wind may bring on an attack He must avoid excitement and emotion, particularly anger He should go early to bed and rest during the week-ends It is well to have the bedroom warmed before retiring

Diet —It is important to avoid over-distension of the stomach, as flatulence is a frequent cause of an attack, as is, particularly, hurrying after meals The dietary should consist of small amounts of food of the lighter foods, such as fish, chicken, toast, eggs, stewed fruit, vegetables causing flatulence should be avoided, and also red meat and broths which contain purins, as these act as vaso-constrictors Fluids should be minimum, and not taken with meals The food should be eaten slowly and thoroughly masticated In many cases the angina is the result of overwork and overworry In these cases, a sedative to the nervous system is beneficial, such as massive doses of ammonium bromide, grains 20, three times a day Other drugs that are beneficial between the attacks are the iodides, especially where there is arterio-sclerosis, or collosol iodine may be given, 1 drachm, three times a day Theobromine, grains 5, three times a day, diuretin, grains 10, three times a day, or better still, theominal tablets, which consist of theobromine and luminal, which act on the nervous system, and are found very beneficial Knoll's calcium-iodo-diuretin tablets may also be tried, and often give good results Many cases benefit from diathermy Two electrodes are used, one on each arm, or one on the forearm and the other between the shoulder blades A current of 750-1,250 milliamperes used for a duration of from 20-30 minutes, three times a week.

Treatment of the Attack —The attack can often be warned off by taking a carminative mixture such as a menthol draught, or dilute phosphoric acid, 20 minims, with spirits of chloroform, and a bitter Or a minim of liquor trinitrini in a carminative mixture Whisky or

even warm water may relieve the first discomfort. On the outset of pain, a capsule of amyl nitrite should be inhaled or a tablet of nitroglycerine chewed. If the vasodilators fail, then morphia, grain $\frac{1}{2}$, should be injected, or a larger dose with atropine. In extreme cases, chloroform may be necessary.

Surgical Treatment—If in spite of all medical measures the symptoms persist, which make work impossible and life unbearable, then operative measures are justifiable. The principle of surgical treatment consists of cutting off the sensory impulses passing from the heart and aorta to the nervous system by means of the cardiac nerves passing to the sympathetic cord in the neck, and then by the rami communicantes to the spinal cord, by means of the first five thoracic nerves. One must remember, however, that there is always the risk of a fatal attack being brought on by the emotion and preparation of the patient for operation, and again, is it wise to abolish the pain, which is nature's warning that the heart is being subjected to too much effort?

The surgical treatment was first carried out by Jonnesco' in 1916, who removed the sympathetic chain on the left side. Coffey and Brown' later suggested a less extensive operation by removing the superior cervical ganglion alone. Eppinger and Hofer' found that section of the depressor nerve, which arises from the vagus and superior laryngeal, was beneficial in some cases, the nerve, however, is not constantly present. A less heroic method has been suggested by Swetlow'—namely, the paravertebral injection of 5 c.c. of 55 per cent. alcohol into the upper five intercostal nerves as close to the intervertebral foramina as possible. In successful cases there is anaesthesia of half the chest wall with contracted pupil and narrowing of the palpebral fissure on the same side (Horner's syndrome). The cessation of pain may last for several years.

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To sum up, the success of treating a case of angina is based on the careful consideration of each individual case, the object being to maintain the heart at its maximum efficiency by a well regulated life

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Diabetes in General Practice.

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CASES of diabetes mellitus may usefully be divided into two classes—a smaller one in which the disease proceeds to undermine rapidly the health of the patient and in which consequently insulin is an essential for successful treatment (this class includes most young diabetics and especially children), and a much larger class in which the health of the patient remains fairly good for a long while, in spite even of the constant passing of sugar in the urine. Among patients belonging to this latter class, I think it will be found that most of them are being treated along the older lines of qualitative dietary, that is to say, the patient has been told that he may not have certain articles of food (bread and potatoes, for instance, which have a large carbohydrate content), but that he may have others (meat, fish or eggs, in which the carbohydrate content is small). The first modern modification of treatment was introduced into this country by Graham of St. Bartholomew's Hospital, and into America by Allen, it has been called the "starvation" method, and also the method of the "ladder diet" which is a better name in every way, but neither of these names indicate the physiological principle underlying it. Of these, the most important is that in the processes of metabolism the three great nutritive factors of the diet are to a large extent interchangeable, what is absorbed from the small intestine as glucose may be formed into fat, and the fat ab-

sorbed may become carbohydrate in the body. More important, it was known that of the protein absorbed a large amount becomes converted into sugar, this is the result of experiments on depancreatized dogs, in which it was shown that feeding them on protein increased the sugar-content of the urine as well as the urea. What happens is that the amino-acids in the portal blood, on reaching the liver, are to a large extent robbed of their nitrogenous moiety, which is forthwith excreted as urea, the remaining part taking its place among the non-nitrogenous products, sugar, glycogen or fat.

The result of applying this knowledge was that not only had the carbohydrate of the diet to be limited, but also the fats and protein, particularly the protein, if the urine was to be kept free of sugar. Hence arises the now familiar diabetic diet-sheet based upon the above principles, and with its calorie value accurately worked out. Another principle of this method is that if a patient first got free from glycosuria by twenty-four or forty-eight hours' starvation, and then given a graduated diet, the calorie value of which is raised each day until sugar reappears, he ultimately reaches a higher diet than he would have if the diet had been gradually reduced from the normal downward. This is supposed to be due to the rest afforded to the over-worked islands of Langerhans. Moreover, the exactitude of the diet enables patients to have the maximum diet that they can make use of, a less exact diet causing the intermittent appearance of glycosuria, as happens under the older methods of dieting. Lastly, there is an important consideration in the psychological effect on the patient if he goes through with such a course of treatment, he becomes to some extent educated in the quantitative method of diet and ceases to harp on the familiar subjects of what he may have and what he may not. He should leave hospital with diet-sheets

which he has studied during the course of his treatment, and be able to examine his own urine for sugar without undue alarm when he finds sugar present. Even if he becomes lax in his routine at home, he is always in a position to right himself by means of what he has learnt.

I want now to give some evidence of the beneficial effects of this method of treatment. The criterion of its success will be the answer to the question of whether we can expect thereby to raise the food-tolerance of patients submitted to it, and I wish to show that by keeping the diet for a long period of time within the limit at which sugar appears in the urine, the food-tolerance can undoubtedly be raised in the case of patients suffering from comparatively mild diabetes. The three patients I am instancing had reached the age of 50 before the disease was recognized, and though it was not possible in all of them to insist on the full "ladder-diet" routine, they each submitted to diets that kept them consistently free from glycosuria. After periods of between one and two years of this strict dieting, they were all of them able to have, without glycosuria, very much larger diets than were at first possible, two of them having quantities of potatoes that would satisfy most of us. I cannot pretend that I know that the weighing of the item of the diet was always exact, but what I can show is the very remarkable effect of the routine dieting on the blood-sugar curves in each case. These curves are shown in Chart 1, and it will be seen from them that in each case (A, B and C), the fasting blood-sugar was lower and the blood-sugar rose to a much lower level during the ninety minutes following the ingestion of 50 grammes of glucose, after one or two years of treatment than had been the case before it was started.

Cases on the border line between the mild and severe forms of diabetes confirm the fact that the disease can

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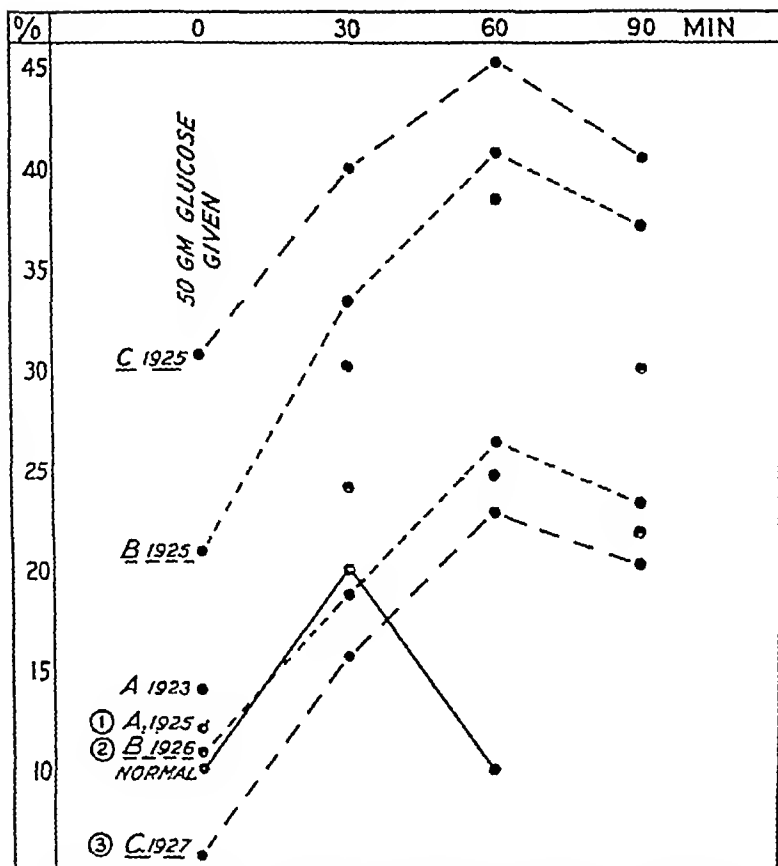


CHART 1—3 pairs of curves to show rise of glucose tolerance after strict diet treatment over periods of 1 to 1½ years. The normal curve is also shown. A, B and C, before treatment, (1) A, (2) B and (3) C, after treatment.

to some extent be held in check by strict diet alone without insulin.

Case 1—For instance, a young policeman, aged 34, quite suddenly acquired diabetes with well-marked symptoms of thirst, wasting and weakness. To look at him one would have said that he would certainly be a case for insulin. However, he was taken into hospital, and after his blood-sugar curve had shown that he was a true case of diabetes, he was given the "ladder-diet" treatment. To my surprise, he reached a diet of about 1,700 calories per day before sugar appeared in the urine, he was at that time very anxious to avoid insulin, and he returned to light duty in the Force in a country district, and for a year maintained his health and weight while remaining consistently sugar-free. He is an intelligent fellow and understood his complaint well, and was able to test his urine for sugar to supervise the weighing out

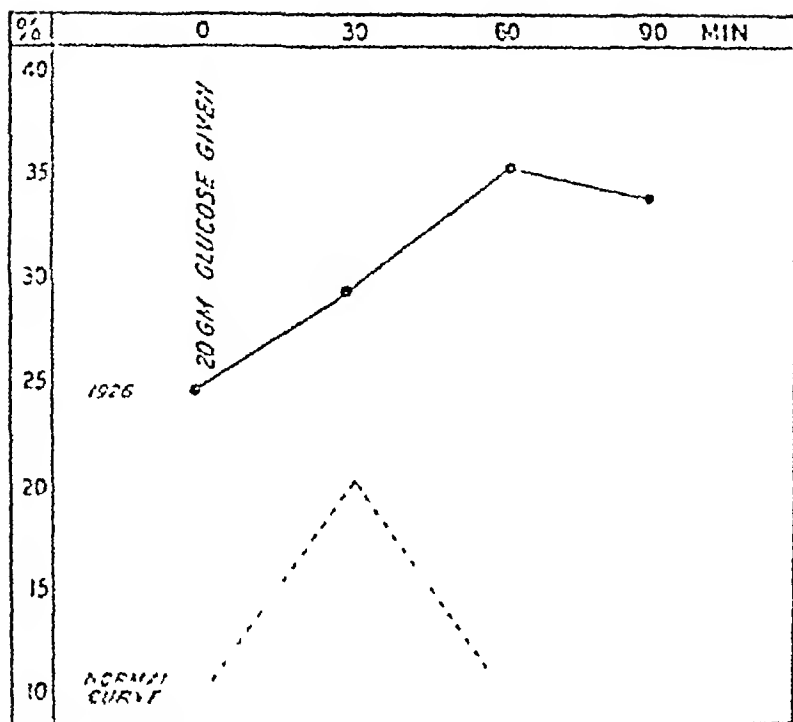


FIGURE 2. Diabetes mellitus in a man aged 54 (Case 1)

of his diet without difficulty. At the end of a very cold winter, however, he returned to hospital, as he was not feeling stronger, and agreed to have a course of insulin to build up his strength, with the idea of reverting afterwards to the original diet. It was interesting to find that, once he had experienced the added benefit of the injections for a while, he announced that he had no intention of giving them up, and for the past two years he has been on insulin treatment and enjoys perfectly normal health and exercise, having gained 25 lb. in weight. He is one of the many instances that belie the statement that is still made that the life of an insulin patient is "not worth living."

I certainly need not here repeat anything about the beneficial effects of treatment by insulin, which are known to most people, but at the time of the introduction of the treatment into this country I was most fortunate in having under my care the following case.

CASE 2.—A very intelligent young woman of age 16, of the Jewish extraction, had been ill for some time with a rather high fever, and was found to have a blood sugar of 200 mg. per 100 cc. of blood. Her symptoms were those of diabetes mellitus, and I can only say that my treatment of her by insulin was most successful.

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of treatment at University College Hospital, was one that I can never forget. She is now nearly seventeen years old, and in perfect health, weighing about seven stone, and it will be of the utmost interest to observe whether she becomes a milder case when the age of growth draws to an end.

In many ways treatment by insulin is simpler than by the "ladder-diet" method alone. It is essential to keep to the rules if disaster is to be avoided and patients usually do so, unlike many of the milder cases who are able to afford more lapses from strict diet and so are apt to get careless about diet and urine-examination. It is in my opinion essential that in insulin cases diet-weighing should be exact and urine-examination regular. Insulin treatment is merely an extension of the quantitative method of dieting, with this exception, that unless the diet is kept up to the level of the insulin hypoglycæmic symptoms may result. The balance between the diet on the one hand and the insulin on the other must be kept exactly adjusted, and a urine kept constantly free from sugar, reinforced by occasional blood-sugar examinations, will be a sufficient criterion. The balance often tends to move one way or the other, e.g. during tonsillitis and chicken-pox the dose of insulin had in the child already mentioned to be raised considerably to abolish glycosuria, consequently when these attacks were subsiding, hypoglycæmia had to be especially guarded against. With these and similar precautions, however, it may be said that the treatment is simple, the patients remain in good health, and there is a considerable margin of safety that makes hypoglycæmic symptoms a rarity. Should they appear, prompt treatment by a stick of barley-sugar is rapidly effective. It is important, by the way, that these patients should always have sugar close at hand, e.g. a sail on the sea and other causes may cause vomiting and hypoglycæmia from withdrawal of sufficiency of diet.

However, things are apt to go wrong now and then

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in an insulin case, usually owing to the breaking of rules, which, as I have said, is highly dangerous. The first example I saw of this was the following —

Case 3—The patient was a child who showed a constantly increasing need for insulin in spite of an apparently constant diet. The doses were at length becoming so large that I gave instructions for her to be kept in bed. The same evening I was sent for in a hurry, and found the child with obvious signs of hypoglycemic collapse and a very low blood sugar, in spite of the fact that there was sugar in the urine. It appeared that one of the other patients had up till that time been giving her sweets surreptitiously, and when this supply of sugar was suddenly cut off by her confinement to bed, she quickly became hypoglycemic. (Cases that are admitted to hospital with impending coma are usually those who for some reason have thrown rules to the wind.)

The important thing about this particular child is that had one relied upon the urine-test and not upon the general appearance and the blood-test one might have given insulin instead of sugar, and finished the patient off. In cases like these i.e. insulin cases that are for any reason undergoing any upset, the urine is very fallacious. Suppose, for instance, a patient has an overdose of insulin at eight o'clock one morning, what will be the effect upon the urine? Insulin will have its maximum effect about four hours after the injection, but the urine obtained for examination may, some of it, have been in the bladder for many hours, i.e. before the blood-sugar was sufficiently lowered by the dose, and so contain a lot of sugar at the time a patient is suffering from hypoglycemia. We could then only get a true sample of urine by catheterizing the ureter and examining the urine being passed at the moment, and it is simpler to get the other side of the glomerulus and to examine the blood direct. For the same reason, when a patient is being first put on to insulin, it is a good plan to rely upon blood-sugar done four hours after the injection, but one does not want to inflict too many of these on patients, so the best method is to have specimens passed dial. two and a half and four hours after the injection. As the dose rises from

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day to day, it will be found that the second specimens passed (i e four hours after injection) are first clear of sugar, the others following a day or two later. If one merely relied upon the specimen, it would be possible to give a patient an attack of hypoglycæmia while the urine still contained sugar.

At least one blood-sugar estimation should be done upon every diabetic unless he is beyond all question a true case, for the reason that there are a certain number of cases of renal glycosuric patients whose blood-sugar is normal, but whose kidneys filter off a certain amount of sugar when the blood-sugar is above, say, 0.16 per cent.

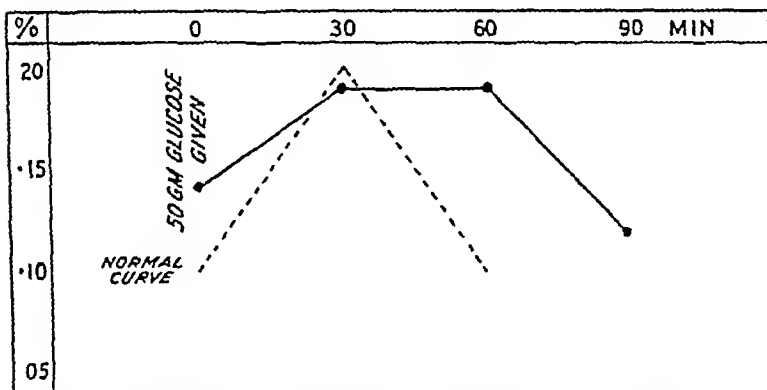


CHART 3 —Renal glycosuria in a youth aged 18 (Case 4)

Case 4 —I treated one young man for a year along strict Graham principles, and found when I took up blood-sugars that his sugar-curve showed no rise above the normal line. He was very nice about it, partly because his curve enabled him to be accepted as a first-class life by an insurance company, partly, perhaps, because he had not been given insulin, and would never need it—indeed, it would probably kill him.

There are a great many points of interest in the use of insulin that emerge in general practice. For instance, in certain mild cases of diabetes, when it is possible to treat the patient by quantitative methods of dieting without insulin, it is often necessary to begin with a course of treatment by insulin, otherwise the blood-sugar will not drop to normal nor the glycosuria

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disappear. Once the blood-sugar becomes normal the insulin may be dropped. With regard to gangrene, provided the process has not spread too far, it will often be found possible to avert its further spread by rapidly increasing doses of insulin. In such favourable cases, the gangrenous patch becomes limited and the dusky areas of threatening gangrene revert to a healthy appearance.

Blood-sugar estimations are very helpful in any such cases when the dosage is being rapidly increased, but it is in the life-and-death emergencies of coma that they are essential. In comatose patients under treatment, the blood-sugar is apt to fall very suddenly, and unless this is ascertained the patient is very easily rendered hypoglycæmic. In one case of very sudden onset of coma, the dosage for the first three days was 200 units, 220 units, and then 10 units respectively, and in such a case it would be very risky to attempt to modify the dose merely from the clinical condition and the examination of the urine. Similarly, in deep hypoglycæmia, confirmation of the diagnosis by estimating the blood-sugar is very reassuring before one gives large quantities of glucose by the vein. In some patients with pulmonary tuberculosis and diabetes concurrently, treatment by insulin is very successful, so much so that I have wondered whether the tuberculosis would not have been rapidly fatal had it not been for the diabetes necessitating insulin treatment.

Disorders and Accidents of Athletes.

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AN athletic life is in many ways a safeguard against ills of the body, since the regular and active exercise of all its members is secured, and strict discipline is imposed upon its appetites. The nice judgment of the amount of training required to bring the body to its highest pitch of efficiency is, however, a matter requiring great experience, and varying with every individual and with his particular form of athletics. Therefore, since youth not only supplies the enthusiastic personnel, but also its concomitant inexperience, it is hardly surprising to find that in the wake of the cult of physical fitness disorders and disasters may attend. Regular healthy exercise builds up the frame, oxygenates the tissues thoroughly, assists the excretions, and benefits every organ in the body as a *sine qua non*. It is not with this aspect that this article is concerned, but with the effects of competitive strain.

An old adage says "It's the *pace* that kills." This should be rendered "It's the *ill-judged* pace that kills." That is to say, if the preparation had been better, or the race better judged, the "killing" could have been avoided. I exclude the athlete who never was physically sound enough to compete at all.

The most familiar disorders to which athletes are prone include staleness, fainting after a hard race, "strained heart," albuminuria, rupture of tendons and muscles. These have an interest not only for the athlete (who does not worry until the condition actually super-

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venes in his own person), but for those responsible for him, who want to know "Ought my son to row, or will he strain his heart?" "Is the quarter-mile too punishing?" And, "Is it bad for Blank, who is a light three-quarter, to 'put' the 16 lb weight?"

It is commonly maintained by one school of thought, of which I was until recently a humble disciple, that it is impossible to strain the heart of a perfectly sound individual by hard exercise. When cardiac lesion followed excessive exertion it was held to be toxic, and the blame was laid at the door of some latent focus of sepsis, such as diseased tonsils, a chronic appendix, intestinal stasis, sinusitis, or some similar cause. Further experience now leads me to believe that a primary strain may occur in the hearts of hitherto perfectly "aseptic" individuals, and I have known apical bruises develop in at least two such undergraduates who were ex-public school champion athletes, and whose athletic careers were thus finished. The cause in these cases was identical, namely, over-competition. A boy of 18 or 19 cannot, in my submission, run two and three middle-distance races an afternoon and play other games once or twice a week for two terms, without going absolutely stale or possibly straining his heart.

Fatigue, Stiffness, and Staleness—During violent exercise, as soon as the oxygen-income is exceeded, lactic acid is set free in the tissues, and "may reach as much as 4 ozs" (A. V. Hill). This is equivalent to about half its weight of concentrated sulphuric acid, and it is only tolerated in the tissues because the muscle fibres contain a large alkali reserve. As soon as this has been drawn upon, the muscle becomes acid and ceases to function, the condition being described as "fatigue." Simultaneously, the respiratory centre is automatically stimulated by the increased H-ion concentration in the circulating blood. The rapid and deeper breathing thus induced sweeps away the carbon dioxide and, by

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keeping the body alkaline, helps in recovery from fatigue '.

A trained athlete has gradually accustomed his muscles (and probably his respiratory centre) to tolerate larger concentrations of lactic acid than an untrained man. His lungs are by nature and subsequent development of large capacity and high permeability. When despite these initial advantages the athlete undergoes sufficiently violent or prolonged exertion he may contract various disorders. These, however, such as the stiffness and straining of the muscles are mostly exaggerations of normal physiology. The glycogen in the muscle-fibres has broken down into lactic acid which, when the rate of its production exceeds that of its oxidation, calls for an interval of rest and recuperation, by causing general fatigue, stiffness of the under-trained or overworked muscle, and increase in the rate of respiration to the point of distress.

Staleness — This is less easy to define or to explain. It consists in a lifeless display, below his average form, by an over-trained athlete. His complaint is not so much of early fatigue as of inability to do himself justice, or as the Americans say, to put any " pep " into his performance. Constantly repeated muscular fatigue without sufficient intervals for repair may be supposed to impair the tone of the muscles called upon. This is borne out by the practical experience which tells athletes to " ease off " for about three days before an important contest. But it may be that there is also some more subtle factor involved, such as exhaustion of the available secretion from the ductless glands. Having regard, for instance, to the part played by the secretion (adrenalin) to the suprarenals in the mechanism of " fright-and-flight," such a hypothesis would to my mind be by no means fantastic.

If the athlete be subjected to still more violent or prolonged ordeal, he may reach a stage further than

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fatigue, stiffness or staleness, and complain thereafter of rapid beating of the heart on slight exertion, especially if undertaken soon after food. He is quite unable to run fast or to row a course, and his heart is always reminding him of its existence when he is thinking of other things, and he may complain of insomnia, nervousness and giddiness. On examination, these patients respond poorly to exercise-tolerance tests, and in some a definite apical systolic bruit may be heard, indicating actual cardiac dilatation. He has now "strained his heart." Such a condition of primary cardiac over-strain is defined by F. W. Price¹ as "a cardiac disorder which is the immediate result of excessive physical exertion in an individual whose heart has been sound" . . . but he adds that "indeed it is questioned by some whether the affection can occur in persons with previously sound hearts who have been properly trained."

The treatment for this condition is mainly rest, followed by carefully graduated exercise under supervision. The prognosis varies a great deal in individual cases. In the young and healthy, and in the absence of any previous disease, recovery is the rule, especially in the less severe acute cases in which recovery may take place in a few weeks, but in many, progress is very slow.

"*Burnt Out*" *Athletes* —In following up the consequences of severe exertion, from mere muscular stiffness to actual impairment of the heart, it must occur to anyone who is closely connected with athletics, to wonder what becomes of the brilliant schoolboy athletes who shoot like meteors across the horizon of their school days and disappear from public notice like damp squibs. I knew a remarkable boy athlete who won no fewer than six events at the biggest public school in England, and who appeared to be hurled by the time he reached the university. He failed to be

placed in the Freshmen's sports, and after an unsuccessful term took to beagling and abandoned the track altogether. There are many like him, in whom there are no apparent physical signs of cardiac or other trouble, but the standard of performance entirely falls short of its early promise. This vague condition may never have been scientifically investigated, and I admit that my suggestion that premature exhaustion of the adolescent ductless glands as a factor is mere guess-work, but certain it is, that in practice all athletes of the Olympic Games class, and particularly those who have had administrative experience, are agreed that the "Victor Ludorum" award at schools is pernicious. Not only is it found to be thoroughly bad for schoolboys to run themselves out at all kinds of distances consecutively, but that the same applies to the older undergraduate. In the Cambridge University Athletic Club, after the war, a rule was made limiting each competitor in inter-collegiate sports to three events, but as the various rounds of the competition succeeded each other at very frequent intervals, it was found that even this rule was insufficient to protect certain individuals from staleness and strain. Thus one well-known "blue" used regularly to win the half-mile, one mile, and three miles in fast times for his college on the same afternoon every week, in addition to University handicaps, for a term and a half, with the result that he failed to be placed in his own "full-blue" event in the University trials. The rule was therefore amended to read that of the three possible events, at least one must be a field event—thus stimulating agility (or explosive co-ordinated muscular action), and easing the burden of endurance.

In discussing the "burnt-out athlete," two cases may be of interest. Douglas Lowe, after winning the Olympic 800 metres in 1924, set himself to run his races as slowly as he conveniently could, with the definite aim of

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fatigue, stiffness or staleness, and complain thereafter of rapid beating of the heart on slight exertion, especially if undertaken soon after food. He is quite unable to run fast or to row a course, and his heart is always reminding him of its existence when he is thinking of other things, and he may complain of insomnia, nervousness and giddiness. On examination, these patients respond poorly to exercise-tolerance tests, and in some a definite apical systolic bruit may be heard, indicating actual cardiac dilatation. He has now "strained his heart." Such a condition of primary cardiac over-strain is defined by F. W. Price¹ as "a cardiac disorder which is the immediate result of excessive physical exertion in an individual whose heart has been sound" . . . but he adds that "indeed it is questioned by some whether the affection can occur in persons with previously sound hearts who have been properly trained."

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inter-collegiate athletics, about 3 per cent of all men who took part sustained serious or potentially serious injuries They were classified as follow —

Chronic sprains disabling for more than three weeks	523
Dislocations	318
Concussions	240
Fractures	188
Collapse	30
Internal injuries	21
Total	<u>1,320</u>

This accords with the experience of eleven years at Cambridge University In regard to the causes of accidents it is found that the order of games in proportion to their casualty lists is —

(1) Rugby football	12	per cent	per season
(2) Boxing	51	"	"
(3) Association football	46	"	"
(4) Cross-country	15	"	"
(5) Ice hockey	14	"	"
(6) Track and field athletics	13	"	"
(7) Rowing	12	"	"
(8) Swimming	Nil	"	"
(9) Fencing	Nil	"	"

This amply confirms the common opinion that football is the most hazardous of college sports The very high incidence of injuries at football undoubtedly arises not only from the tradition of ignoring all hazards in going for the ball or the man, but from lack of proper training, the playing of men who are over-tired, and of inadequate medical supervision of doubtfully fit players It must not be thought that rough play is entirely responsible for serious injuries I have had to operate upon a wing three-quarter who sustained a complete backward dislocation of the ankle, fracturing both tibia and fibula into the joint, simply from pivoting sharply to kick while running towards his own goal

Fractures and dislocations are, of course, treated on ordinary surgical lines, and there is no need to discuss them here at greater length Concussion is a subject worthy of more emphasis, as it is the most

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neglected of all sports injuries. As soon as a man regains consciousness, he is encouraged by his team and supporters to play on, and often functions successfully as a pure automaton for the rest of the game. In my opinion it is essential that not only should such players not return to the field, but that they should be kept quietly in bed until their pulse, blood-pressure and nervous reflexes become stabilized at the normal again. If this is not done, as anyone with any experience of head injuries knows, these cases may suffer later on from intractable headaches, impaired memory and other after-effects, and at a late stage it is very difficult to do much for them.

A word of warning is also very necessary in regard to the treatment of sprains and badly-bruised muscles by friends on the field. Most of the pain in these cases arises from the tension of swellings produced by the rupture of small vessels. Before absorption can begin, the patent mouths of these vessels must become plugged with clot, which later proceeds to become organised. Consequently rough handling, rubbing, and manipulation of the joint or muscle, either immediately or even prematurely (e.g. that evening) can only defeat the processes of healing, and result in further extravasation, pain, and lengthened incapacity. Massage, of course, has its place at a later stage. I feel that much sick-vastage could be avoided if in every football or other changing room there appeared a notice:

"Unless medically authorized (1) Do not immediately massage injured joints and muscles. (2) Do not allow concussion cases to 'play on'."

Disorders -- In addition to the accidents and organic strains incidental to the pursuit of athletic, certain disorders occur with great frequency—namely, pharyngitis and tonsillitis. *Septic Sores*. The liability to outbreaks of boils on the buttocks and to pubic and genital abscesses is almost peculiar to

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rowing men, and probably arises from inoculation with bacteria from polluted river water entering through friction abrasions. It is difficult to prevent these disorders, but the sick wastage they cause may be greatly curtailed by prompt surgical treatment.

Tinea Cruris is a very uncomfortable affliction, especially when running in chafing shorts in cold weather. It seems to arise mainly in those whose football or running shorts have lain stagnant in dirt and perspiration in a locker throughout the season or even several seasons! Happily tinea yields very readily to treatment and can be avoided by cleanliness in locker rooms and clothing.

CONCLUSIONS

(1) Athletics, properly conducted, undoubtedly contribute definitely to physical health as well as to sheer enjoyment.

(2) That whereas some consider exercises in general and athletics in particular to be a panacea for all ailments from flat foot to melancholia, the fact is that each individual must have his exercise suited to his physical capacity or disaster may result.

(3) To quote the Carnegie Foundation Report: "There exist serious deficiencies in the relations of the medical profession to college athletics. All athletic aspirants are not subjected to adequate physical examinations to determine their physical fitness."

Upon the basis of a careful medical examination, quite irrespective of the supposed exigencies of the situation, a doctor should decide the availability of a player, when physical fitness, or the effect of training upon him, is in doubt. Participation in an excessive number of sports is still permitted, and is too frequently urged upon prominent athletes.

(4) That minor skin disorders may be prevented by better hygiene in regard to locker-rooms and clothing.

(5) It would seem that in any youthful community —

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(a) Many through ineptitude, slackness or dislike of athletics do not participate and therefore do not gain this benefit

(b) Some, marked out by conspicuous success, are encouraged positively to harm themselves by excessively frequent and strenuous competition

(c) A good player, athlete or oarsman who takes care of himself may last at World's Championship standard until he is anything from 26-30 years of age (A. G. Hill, aged 30, Great Britain, won the Olympic 800 and 1,500 mètres at Antwerp in 1920)

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The Treatment of Visceroptosis.

By H CECIL BULL, M B, M R C P

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VISCEROPTOSIS, the low position of the viscera in certain subjects, probably does not of itself cause any symptoms, but because these subjects are rather poor stock and liable to minor ailments, their abdominal troubles are likely to be accounted to the ptosis of their viscera. This was first suggested by Glénard,² who before the days of barium meals, and four years after Roentgen's discovery, described a condition of spasticity in low-placed colons with disturbance of blood supply, pain and constipation. Hence "Glénard's disease." The subject is best considered in two parts—visceroptosis and dyspepsia. That they frequently occur in the same patient is well known, but dyspepsia is a common disorder and is more often due to something other than low viscera.

There are certain features in the etiology of visceroptosis which have been unduly stressed. It is said to be commoner in women, perhaps due to child-bearing or to the clothes women wear, although the latter can hardly be significant now. Mankell and Koenig suggested postural defects and recommended exercises for restoring the viscera to higher positions. Faulty interpretations of opaque meals in the earlier days of X-rays gave origin to the belief that sharp bends in the stomach and intestines caused delay in the passage of these meals.

The great majority of patients whose viscera are low owe it to heredity. Bryant divided the race into herbivores and carnivores, the broad and the slender,

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while Hemmeter suggested that the slender type was the product of inbreeding of inferior stock on the normal Aryan race. Ellis¹ regards the broad type as a poor eliminator and the slender type as a poor assimilator. He says that the big-chested, rubicund man lives healthily, eliminates badly, grows fat and dies comparatively young from arterial or kidney disease, while the narrow-chested, visceroptotic type assimilates badly, spends a miserable youth, and if he escapes the sepsis to which he is liable lives to enjoy a comfortable old age. Psychologically these types also differ. Kraepelin divided the insane into two groups, the manic-depressive and the dementia præcox. Kretschmer⁴ brought these into line with everyday types of physique and character and described the "circular" physique with a personality he called "cyclothyme," represented in insanity by the manic-depressive of Kraepelin. The "schizoid" type with "schizothyme" personality was represented by dementia præcox. These cyclothyme and schizothyme types of Kretschmer correspond to the broad and the slender.

Routine X-ray examination has done more than anything to define the normal relation of viscera position to body structure. Mills⁵ calls this relation "habitus," and describes the broad habitus or hypersthenic, the slender or hyposthenic and the intermediate common type, the sthenic. The hypersthenic patient has broad, square shoulder, and the lung apices project little into the neck. The chest is short, the ribs transverse, and the costal angle wide. The stomach is high under the diaphragm and lies almost transversely across the abdomen. The hepatic flexure and transverse colon are also high, and there is no room for the liver or mobility of the kidney. Conversely, the hyposthenic has sloping shoulder, high projecting lung apices, a long chest with oblique ribs,

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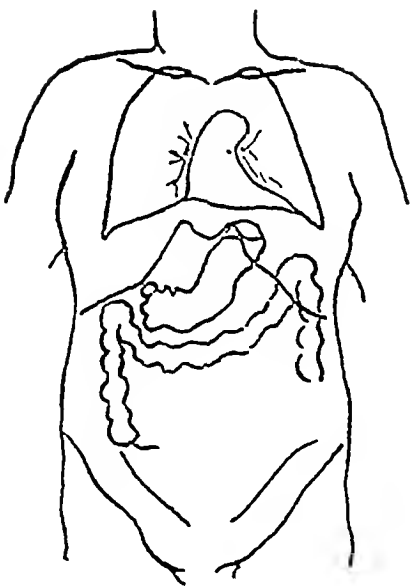


FIG 1—Hypersthenic habitus (Dr R Walter Mills)

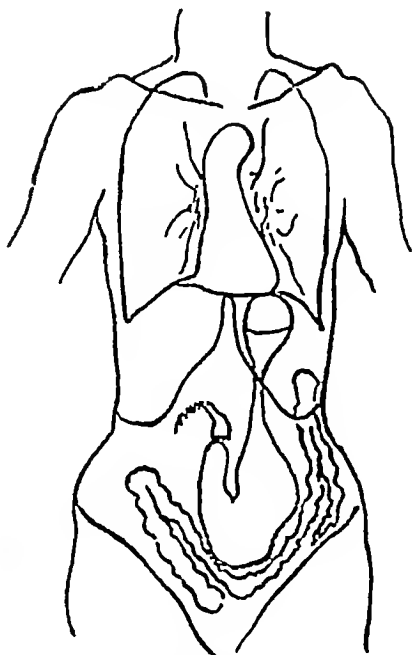


FIG 2—Asthenic habitus (Dr R Walter Mills)

and a narrow costal angle The stomach is long and passes vertically down to the pelvis, whence it turns upwards towards the duodenum like a fishhook or letter J The transverse colon likewise lies along the floor of the pelvis Whereas the high stomach seems to grip the meal on entry, the low stomach has poor tone and slowly takes up the work of peristalsis The stomach usually takes a little longer to empty In metabolism, in thought, in action, in emotion, in everything they do these patients are slower in movement Like the tortoise they tend to live longer Very likely they are constipated These two types are the extremes, between them is the majority, a common average with a tendency toward one or the other end of the scale Anatomically, physiologically, psychologically the human race falls into this grouping

Symptomatology—There are no cardinal symptoms of visceroptosis, many patients with low-placed viscera

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have no symptoms. The most we find—and which is common to hyposthenics—is a sensation of weight in the lower abdomen after prolonged standing. Glénard had a test, increased discomfort from downward pressure on the abdomen in the erect position. Tenderness over the cœliac axis is also described. Renal crises were described by Dietl, but they are very rare, and have probably been accounted for in other ways with improved methods of investigation.

It is important to distinguish these few symptoms from those of dyspepsia in patients with visceroptosis. Such patients are hyposthenic and melancholy and particularly liable to dyspepsia from other causes. A study of the symptoms and an investigation to exclude organic disease of the alimentary tract, gall-bladder, kidneys, and the pelvic organs in women will often place the trouble as an organic or a reflex dyspepsia and save the patient from the label of "Glénard's disease."

Treatment.—Since visceroptosis is a question of heredity and habitus, aggravated, perhaps, by organic disease and environment, the first principle is to direct treatment at the patient rather than at the position of the viscera. Sepsis of the teeth and tonsils and, in women, chronic leucorrhœa should be looked for and corrected.

In certain cases of extreme asthenia it is advisable to begin treatment by putting the patient to bed for a week or two to ensure mental and physical rest, but this is to be regarded as a preliminary to the effort they have subsequently to make to come back and regain their place among normal human beings. After this period of rest they are to start graduated exercises.

Hyposthenic patients dislike effort both of mind and body, and they need continued encouragement to lift them out of their lethargy. We are fortunate if we can induce them to take an interest in games or sports.

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bathing or walking, but in any case they should be induced to take some exercise in the open air every day. A course of physiotherapy is good because it ensures regular attendance and concentrates on the systematic exercise of all the body muscles. Nature's waistcoat is better than a surgical belt, and a real development of the abdominal muscles will do more than anything to increase these patients' comfort.

The patient with visceroptosis finds considerable relief from a belt, and should be allowed to wear one until the abdominal muscles have begun to take up their slack again. It seems a bad principle of pandering to their lazy habits, but it helps them through the difficult early stages of treatment and they like it. The belt should be one of simple abdominal support without any pads. It is surprising how belts with pads designed to support the various viscera came to be used, since no belt can be worn which withstands the muscular effort of breathing in the erect position. There is a good deal of suggestion with a belt, and a simple tight-fitting woollen belt which by the natural elasticity of the wool gives the desired sense of support is effective.

It was natural that as surgery developed and Glénard's disease appeared some form of surgical remedy should have been devised for the relief of the supposed disease, but although surgery may do no harm by hitching up the viscera here and there, it does no good. If the viscera exert traction on their natural supports it is better that they should do so than exert traction on unnatural supports.

With metabolism speeded up by increased exercise and intake of oxygen comes the hope of improving assimilation. We would like to see these patients put on weight, but that is very difficult. It is no use feeding them up with soluble starchy foods; they do not put on weight, and they are liable to headaches and

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biliousness. They are nearly always constipated. It is better to keep away from the standard list of fattening foods, and not to worry with the theory of calories. They should be allowed to eat proteins, vegetables and fruit without restriction. They can eat bread, rice and oatmeal in moderation, but they should be taught that they are accessory foods to be added to their diet, but not used as a basis. Patients with viscerop-tosis are often small and delicate feeders who make their meals chiefly of starches like a perpetual afternoon tea. They should be discouraged from this. Sugar should be restricted to the minimum required for flavouring, and the mixtures of starch and sugar, pastry, cakes, and puddings should be entirely prohibited. I advise them to eat wholemeal bread, partly because of its vitamin content, and partly because it is less appetizing than white bread.

Fats need not be restricted, but I never encourage patients to take fats if they nauseate them. This nausea—if it is not psychic—is much lessened when the starches are restricted. Butter, cream, and olive oil are allowed and are usually well tolerated. Like all people who are fond of sugar and starches they dislike alcohol, but I recommend beer and light wine unless they interfere with the appetite.

Drugs.—Patients with viscerop-tosis like drugs and patent foods and medicines which are said to build up strength, etc. The few drugs which are good for them should be carefully selected. The best group is the group we call tonics, strychnine, quinine and the phosphates of iron, lime and soda. They should be prescribed with mineral acids. Alkali is harmful to depress a hyposthenic patient, and should not be given unless there is some clear indication for doing so. The indication is organic disease, such as pyelitis or colic infection of the urinary tract, and then the symptoms are due to the disease and not to the

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visceroptosis. Halls-Dally³ points out that endocrine dysfunction is commonly found with low blood-pressure. Some cases of visceroptosis react well to thyroid extract, especially women after the menopause, but the effect of this treatment should be carefully watched because some patients react badly even to small doses.

Intramuscular injections of metals, such as iron and arsenic, are recommended, and they seem to do some good. They are certainly stimulating. I have seen improvement in a patient with hyposthemia and visceroptosis from a single intravenous injection of calcium, but I have never been fully convinced of the wisdom of putting these complex substances through the first or second lines of body defence; it is an open question whether the body really welcomes under compulsion what it refuses through the natural channels.

Constipation is often a real trouble and needs some help beyond that of exercise and diet. Our object is to give the least possible cathartic which will effect the daily action of the bowels. The preparations of paraffin and agar are good, but often they are ineffective except in large doses, which are undesirable. Confection of senna or pills of aloes or cascara may be used in addition, but always the patient should be encouraged to co-operate and work towards reducing the dose of cathartic. They should not be allowed to use enemas. The enema habit is easily acquired, and with it follows hypochondria and neurasthenia. The colon becomes irritable and toneless, the splenic flexure is dilated, and a reflex dyspepsia develops from chronic colon irritation. In such patients the "cascade," or "cup and spill," type of spasm of the stomach may be found in the course of a barium meal. The spasm is reflex from irritation of the colon.

Conclusions —Some degree of visceroptosis exists in 25 per cent of civilized people, but only a small

number of these have symptoms due to their low viscera. The position of the abdominal viscera depends on the build or "habitus" of the patient. In the words of Carman, "The stomach fits the abdomen to which it belongs." Visceroptosis and hyposthenia go hand-in-hand, and treatment should be directed at the general health of the patient without regard to the position of the viscera. These patients are liable to chronic ill-health, and when they have symptoms of dyspepsia should be carefully examined to exclude organic disease.

References.

- 1 Ellis "Reaction in Relation to Disease," London, 1924
- 2 Glénard "Les ptoses viscérales," Paris, 1890
- 3 Halls-Dally *West Lond Med Journ*, 1920, xxxiv, 185-197.
- 4 Kretschmer "Physique and Character," Tübingen, 1925
- 5 Mills *Am Journ Roentgenol*, 1917, iv, 155-167

The Vagaries of the Tonsil.

By H. NORMAN BARNETT, F.R.C.S.

Surgeon to the Bath Ear, Nose and Throat Hospital

THE differences of the pathological tonsil are infinite, and it is for this reason that its removal has to be faced in so many different ways. To judge by the description in the textbooks, many writers would appear to regard every tonsil in the same way, and its operative treatment as following one line, but nothing could be further from the facts. Failure to realize and teach this has allowed countless generations of medical students to pass into the ranks of the general practitioner without being really equipped for the work of diagnosis and treatment of disease of the tonsils. Yet, almost as a matter of course, practitioners accept the responsibility of advising for or against the operation of tonsillectomy.

The diagnosis of the tonsil that should be removed is not so easy as is imagined. The tonsil which is merely enlarged—even much enlarged—on the one hand is often not necessarily the type for removal, while on the other hand the small buried tonsil completely hidden behind its folds of the pillars of the fauces is frequently one that should be removed and which, if left, will cause infinite harm. In children, the enlargement of the tonsils, when unaccompanied by septic or other changes, may be of a temporary nature, and operation should be postponed so long as the enlargement is not of such dimensions as to interfere with breathing or deglutition. The child should be kept under observation, and if the condition does not become normal in a few months, enucleation should be carried out, as

the continual increase in size will have led to pathological changes in the gland. This type of tonsil presents few difficulties in removal by an expert operator with the guillotine, or the guillotine with pressure of a finger on the anterior pillar, and as a rule the hæmorrhage is slight in amount. The pitfall, however, is that, owing to their size, the inexperienced operator will tend to cut off a substantial slice and congratulate himself on "having got that one." The embedded portion of these tonsils should be just as carefully removed as any other, and owing to the comparatively recent onset of pathological change, there are usually few if any adhesions, while the size and substantial nature of the protruding mass helps towards easy manipulation. Should such tonsils be sheared off and not enucleated, they will as a rule rapidly regain their original size, or nearly so, and be thought to "have grown again." A somewhat similar type of tonsil may be met with in adults. In them, there is no object in waiting for possible resolution, as it will not take place. Here the tonsil will almost invariably have adhesions, and to bring it within the circle of the guillotine a pair of forceps—Wangh's or the author's—will be required to draw the gland out of its bed.

The other extreme of type is the small buried tonsil, the site of chronic septic changes. This is the most dangerous for it is out of sight and cannot be seen unless specially looked for by pulling back the anterior pillar of the fauces, and even then the condition will not be appreciated unless pressure is exerted on the tonsil, when pus will be expressed from the follicle, and especially the lacuna magna. Sepsis is usually intense in this type, which is often missed by the practitioner, with his mind fixed on a large protruding gland, who can see nothing amiss on looking at the throat and pressing down the tongue. It is this type which gives rise to local infection, leading to carcinoma.

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tional diseases of many sorts—rheumatism, arthritis, intestinal poisoning, general ill-health, etc. Every student should be taught how to examine for this type of tonsil and estimate its dangers. The difficulty is often increased by the pillars meeting in the mid-line and being matted together, but the practitioner may rest assured that if he cannot separate the pillars of the fauces to examine the tonsil, he is dealing with a very septic gland, which should be removed by careful dissection. These buried and adherent tonsils are not confined to the adult, being frequently present in children who have had repeated attacks of tonsillitis or frequent “sore throats,” and in these the dissection type of operation must be carried out, and it is useless for anyone without expert knowledge and experience of the operation to undertake it.

Still another type of tonsil is of common incidence—the abscess cavity in which nothing of the original gland remains, but has been gradually broken down by septic inflammation into thick pus and enclosed in a thickened capsule which has frequently given way posteriorly. When operating on this type, great care must be exercised, first, to remove all remnant of gland, the capsule and that portion of posterior lymphoid tissue which has become infected and thickened, and secondly, to avoid the possibility of the contents of the abscess being drawn into the lungs. It will be found of great service to keep the suction apparatus at work while operating. If the pus is too thick for the nozzle of the pump, it should be carefully swabbed away. It need scarcely be stressed that this type of tonsillar disease, often buried and out of sight on ordinary examination, is a source of great danger, and focal infection is of very frequent occurrence in such cases.

The lower pole of the tonsil often presents difficulties. It is sometimes apparently continuous with the substance of the tongue, and muscular fibres may be

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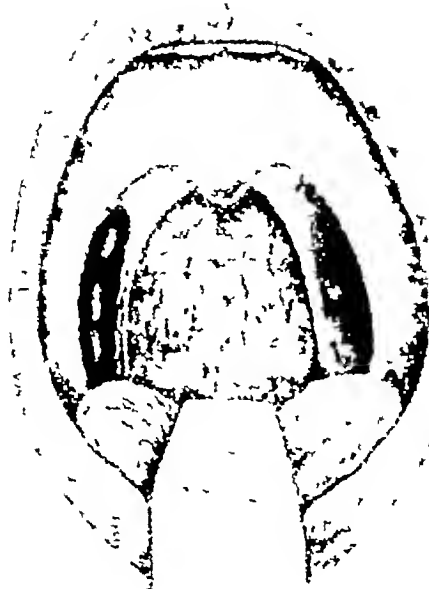
removed with it. From this it must be carefully dissected free, and the apparent muscle should not be removed, though it may seem on casual inspection that thus some of the lower pole is being left behind.

The anterior pillar is sometimes a cause of disquiet, as in certain cases it appears that it is a portion of the tonsil owing to its thickness and close connection with the gland, or it may be concerned in the tonsillar disease and a portion may require removal. In other cases, the posterior pillar continues down for an abnormal distance, to blend with the pharyngeal tissues. This unusual pillar need not trouble the operator, and should not be interfered with. It generally contracts and retracts after the tonsil has been removed.

The capsule is subject to vagary, and is frequently not the complete and definite structure that some descriptions would lead one to suppose. It is nevertheless important, as a rule, to demonstrate it and to remove the gland complete with its capsule. It is sometimes found that pus is present behind the capsule, and this should be remembered in dealing with the tonsil bed. For example, it is not advisable to apply ligatures or stitch up the pillars of the fauces in such cases. They are also unsuitable as a general rule for any other treatment than emucleation.

Abnormality of the blood supply, both as to size of the vessels and their tributaries and branches, is very common. Thus the arterial supply to the upper and lower poles may differ so much that haemorrhage may be negligible or severe and may call for widely differing methods of dealing with it, as I have pointed out elsewhere.¹ Again, the position and size of blood vessels in the bed of the tonsil posterior to the capsule may vary, as is shown in the accompanying illustration, in which a very superficial venous structure is seen. This was adherent to the capsule of the tonsil, and great care had to be exercised in dissecting it off. This is an

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example of the pitfalls that waylay the unwary operator, as if this structure had been seriously injured, severe hæmorrhage would have taken place. It is well, therefore, that the operator who desires to perform tonsillectomy should be prepared for many vagaries, and should be equipped to meet the difficulties that may arise in any case.

Reference

- ¹ Barnett, H. Norman "Tonsillectomy" *Brit Med Journ*, 1929, 1, 989

Vaginal Prolapse.

By W. McKIM H. McULLAGH, D.S.O., M.C., M.B., F.R.C.S.
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ONE of the commonest single causes of ill-health in women attending the general practitioner is hernia or prolapse of the vagina. As regards hospital patients, I find that although over half the patients attending the out-patient department suffer from this complaint, yet only 175 out of 1,089 were operated upon for this condition in the Samaritan Hospital for Women in 1929. I am sure that when hospital accommodation increases, and the knowledge of the value of the modern operation for prolapse extends, more patients will seek this treatment.

The relief given by a pessary is greatly lessened by the inconvenience of daily douching, and its replacement by a new instrument every three months, whilst a properly performed operation, as in the case of a hernia of the abdominal wall, is followed within twelve months by a great increase in physical fitness and mental happiness. The ring or Hodge pessary is undoubtedly a great asset in the treatment of young patients during the child-bearing age and in tiding over the discomfort of the patient suffering from prolapse until a convenient season for the operation arrives, but it should not, I consider, be persisted in after the age of forty. Those operated upon during the climacteric do not recover so rapidly. The ideal time of the year to operate is, I find, during the spring months, as the summer months greatly assist convalescence.

Almost the sole cause of prolapse of the vagina is child-birth, and very few women survive that ordeal without some loss of physical well-being and efficiency. The delivery of a child of an average weight of 7 lb. and of 3½ inches diameter, through a vaginal

passage which just admits two fingers before delivery in a primipara, involves severe stretching of the vaginal wall and its surrounding musculature. The latter consists of two lateral bands in front and behind, united in the mid-line by fibrous tissue. The passage of the child tends to force and tear them apart, so that a hernia develops, as it does, in the anterior abdominal wall if the two recti abdominis separate. The hernia of the anterior vaginal wall is the cystocele, and of the posterior the rectocele. Should a complete tear of the perineum occur, a cystocele is seldom added, as the posterior wall has taken the full strain of the dilatation.

The avoidance of prolapse consists in extreme care at delivery. There should be no bearing down in the first stage, forceps should not be applied till the os is fully dilated, the head should be delivered slowly and in the fully flexed position. In addition, I believe in keeping the maternity patient in bed for three weeks after her delivery, and after the seventh day of delivery, when the fear of sepsis is absent, getting her to lie in the prone position night and morning for half an hour. This ensures the anteversion of the uterus and its lying across the vaginal outlet.

Symptoms —The symptoms caused by the cystocele and the rectocele are very definite, and are no longer attributed to neurasthenia, ovarian irritability or neurosis. Those caused by the cystocele are (1) frequency of micturition during the day, and not during the night unless cystitis is present, (2) pain in the left iliac fossa, worse towards evening after the fatigue of the day's work in the upright posture. The main symptom of the rectocele is a low backache, also worse towards evening, and also relieved by rest in the recumbent position. Both the cystocele and rectocele cause a bearing-down sensation, a sense of fatigue and lack of self-confidence, only appreciated by those who them-

selves have suffered from a hernia

The frequency of micturition and weakness of sphincteric control tend to increase with age owing to increasing obesity and lack of muscle tone. The cough of a chronic bronchitis also intensifies this distressing symptom. The frequency itself is due to urine lying in the pouch, produced by the cystocele when the patient is erect. It is residual in that it is below the level of the internal sphincter, and so cannot be voided whilst the part of the bladder on which it rests is the bladder's most sensitive part—the trigone.

The patient, as regards symptoms, therefore, resembles a male with an enlarged prostate and his retroprostatic pouch of urine. Bouts of urinary infection, usually by *B. coli*, are liable to occur as a result of the stagnation, and cause further increase of frequency by day and additional frequency by night. A mixture of pot. cit. and hyoscyamine is most useful during these attacks, as is also a vegetarian diet with copious fluids.

The dragging pain is due to the pull on the peritoneum by the hernias, and the left iliac fossa pain by the left ovary being pulled against the rectum. Actual incontinence on coughing or laughing is not infrequent, and is due to the stretching of the internal bladder sphincter by the weight of the cystocele.

Retroversion with Prolapse—Owing to the vaginal descent, the cervix comes downwards and forwards so that the body of the uterus becomes more erect, and in a proportion of cases falls backwards into the pouch of Douglas where it may become adherent.

This retroversion of the uterus produces a marked variety of symptoms which it is most important to recognize. I have found such patients treated medically without avail for nausea and sickness, constipation, hemorrhoids, metrorrhagia, and mental depression. The pressure on the ovary by the rectum and

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retroverted uterus causes all these symptoms. The mental depression and dyspareunia thereby produced frequently results in marital dislike and unhappiness. The backache is not, in this condition, eased by lying down, and is present night and day. Should pregnancy occur in the retroverted uterus, abortion at the third month or acute retention of urine may occur.

Treatment —The treatment of vaginal prolapse is conservative or radical. If the patient is young and desires further children, or is not willing for an early operation, it is advisable to insert a pessary. It is important that it should be well-fitting—not too tight nor too loose. It should just be large enough to cause a gentle stretching of the vaginal wall laterally. In retroversion cases, a moulded Hodge is most satisfactory. A suitably sized Hodge is boiled for a few minutes, and then its base is broadened when soft by pulling its sides outwards. By doing this, it fits the person's vagina more comfortably and does not fall out on straining. The use of pessaries entails a daily douche, and the insertion of a new pessary every three months.

The modern radical treatment is the Fothergill operation. It consists in repairing the cystocele and rectocele by the reconstruction of the musculature between the anterior vaginal wall and the bladder, and between the posterior vaginal wall and the rectum. If the cervix has lacerations, or is causing leucorrhœa, it is amputated during the course of the operation. A retroversion, if present, is corrected by performing the operation properly, and a ventrosuspension is not necessary unless adhesions are present in the pouch of Douglas. I advise three weeks in bed after the operation, three months' rest from games or heavy work, and warn the patient that it will be twelve months before the full benefit of the operation is attained.

Serum Prophylaxis in Measles.

By R. F. CAMPBELL WARD, M.A., M.D.

MY excuse for writing about such a commonplace subject as measles lies in the fact, that when faced with an epidemic in a large institution, I found myself ill-equipped with any practical knowledge of the protection to be derived from serum treatment. A sentence from the writings of a previous pioneer in this work recurred to my mind, to the effect that $4\frac{1}{2}$ -5 c.cm. of serum from a convalescent patient would ensure immunity, if injected hypodermically within the first week after exposure to infection. The experience gained from a comparison of the results in an almost equal number of cases treated side by side, 21 with and 22 without the serum, may be of some interest and use. Some delay was incurred in finding a suitable convalescent from whom to obtain the serum, and in getting consent for what was regarded as a somewhat novel experiment. I was indebted to my colleagues, Dr. Sinclair Miller and Dr. F. B. Smith, for blood-tests and preparation of the serum, of which 21 patients had $4\frac{1}{2}$ -5 c.cm. hypodermically. The results could be compared with 18 cases (not inoculated) treated under identical conditions, and four others (also not inoculated) treated elsewhere at their own homes. Three under my care of those not inoculated had complications (adenitis and slight otitis media in one, enlarged tonsils requiring operation in another, and acute double quinsy and subsequent tonsillectomy in a third). Of four absences, two were reported as having pneumonia or bronchopneumonia, and two were said to be severe cases.

Of 41 protected by serum, 10 escaped infection,

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and 21 contracted measles at periods shown in the following table.

Within 1st week	Within 2nd week	Within 3rd week	Within 4th week	Within 5th week	Within 6th week	Within 7th week	Within 8th week
3	3	1	6	2	1	1	5

From which it is evident that six cases had the injection too late, whereas 15 did not show any sign of the disease until well after three weeks from the time of inoculation

Immunity—It is clear this is not the right term to employ, but it is fair to infer that the 15 who escaped infection for more than three weeks would have escaped altogether if they had not been subjected to a prolonged and more or less continuous exposure to infection from other people, who had not been inoculated, and who had carried on the disease. The practical point arising out of this is that, in a private family or small community, in which a case of measles develops, either of a severe type or in the more dangerous winter months, the other members could almost certainly be protected against the risk of contracting the illness. Protection, which appears at first to be complete, gradually wanes with the lapse of time.

Complications—Not one of the 21 inoculated patients gave the slightest cause for anxiety, even though the temperature reached a point between 103°–105°. With increasing experience, the comfortable assurance was felt, that after one bad day a favourable course without complications of any kind could be confidently expected. One patient with enormous unhealthy tonsils, and an attack of acute tonsillitis about ten days before measles, had an uneventful history, though the conditions likely to

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cause ear trouble were there in abundance.

Risk.—If the danger of anaphylaxis in those who had had previous serum treatment be borne in mind, there appears to be no risk of any serious trouble; no rash or joint manifestations occurred. Where diphtheria anti-toxin had in one case been given some years previously, the precaution was taken of injecting one drop intradermically, and watching for any marked reaction. Two hours later 1 c.c. was administered hypodermically, and after a few hours the remaining 4 c.c. without any disturbance.

Conclusions.—(1) Inoculation within the first week after exposure to infection will apparently give temporary immunity. The week must be calculated, not from the date of the first appearance of the rash, but from the commencement of the initial running cold, at least four days before the eruption.

(2) The protection wanes with the lapse of time.

(3) If it fails, the ensuing illness will be mild and almost certainly without complications.

(4) A possible modification of the treatment would be to withhold the inoculation until the second week after exposure to infection, with the deliberate intention of getting the relatively complete immunity so often conferred by one attack of measles.

(5) If anaphylaxis be borne in mind, there is no risk.

(6) The serum should be obtained from a well-defined case, in other words, one of moderate severity, and not much later than three weeks after the commencement of illness.

Editorial Note.

THE PRACTITIONER FIFTY GUINEAS PRIZE

THE prize scheme, which was announced some six months ago, has now reached its conclusion. The scheme was intended for the encouragement of junior practitioners to produce original articles, and was restricted to practitioners who had been qualified for not more than two years in order that it might appeal to house physicians, house surgeons, junior clinical assistants and assistants in special departments, as well as to assistants in general practice and young practitioners commencing practice.

It may be said at once that the Prize Scheme has proved a great success and has produced a large number of interesting articles. The articles which appealed most to the adjudicators were those which showed evidence of original work on the part of the author, combined with an ability to present that work in a clear and readable form. Many of the articles reflected the work of the author's "chief" rather than that of the author himself, but that was inevitable in restricting the eligible candidates to those who were holding house and similar appointments. Nevertheless, the standard of the articles was very high, and many showed conspicuous merit and originality. The first prize article is published in the present number of THE PRACTITIONER.

The prizes have been awarded as follows —

First Prize (Fifty Guineas)	E WYN JONES, M.D., Ch.B., 4, Trentham Avenue, Wavertree, Liverpool	<i>A radiographic study of the coronary arteries, with special reference to coronary thrombosis</i>
Second Prize (Ten Guineas)	JOHN BRUCE, M.B., Ch.B., 22, Rutland Square, Edinburgh	<i>A reconsideration of congenital dislocation of the hip-joint in childhood</i>
Third Prize (Five Guineas)	A BRIAN TAYLOR, M.B., Ch.B., 39, Weoley Hill, Selly Oak, Birmingham	<i>The use of artificial pneumothorax in the treatment of pleurisy in pneumonia</i>

Honourable Mention: JOHN HAROLD FOLLOWS, M.B., Ch.B., 2, Malpas Grove, Wallasey, Cheshire — *The electrocardiographic findings in early syphilis*. GEORGE ERIC LEWIS, M.B., B.Ch., M.R.C.P., The Boston City Hospital, Boston, U.S.A. — *The smooth tongue a study in deficiency disease*. L. SHILLITO, M.A., M.B., B.Ch., Boreham Street, Hailsham, Sussex. — *The relationship of calcium therapy to the acid-base equilibrium of the blood*.

Practical Notes.

Prophylaxis of Measles by the Injection of Immune Serum

Barenburg, Lewis and Messer report an epidemic of measles, in which 154 children were injected with immune serum or blood in order to protect them against infection. Three kinds of serum or of blood, namely from convalescent cases of measles, Tunnichiff's immune goat serum and the whole blood of adults who had previously had measles, were employed, and so a comparison of the relative merits of the three methods of protection are available. The serum from persons convalescent from measles is the most effective, out of sixty children who received 6 c cm. of convalescent serum, obtained ten or thirty days after the temperature became normal, 41, or 73 per cent, were completely protected, of the 16 children who contracted measles, 14 had it very slightly. The serums of different ages were equally effective, unfortunately they cannot always be obtained. Tunnichiff's immune serum from goats insulated with a Gram-positive diplococcus was given to 38 children, but they all caught measles, and there was not any mitigation of the symptoms and the percentage of complications was approximately as high as in 23 control cases, in which no protective treatment was attempted. Fifty six children received 15 c cm. injected into each buttock, of whole blood from an adult, usually a parent, who in the past had had measles, of these no less than 43 or 77 per cent, developed measles, but 23 of these had a much attenuated attack. This method was found to be the most practical form of prophylaxis — (*Journal of the American Medical Association, Chicago, 1930* vol. 19)

The Relative Prophylactic Value of Convalescent and of Immune Adult Measles Serum.

The use of the serum of convalescent measles patients to protect people from measles exposed to infection seems established but there is not much evidence that serum or whole blood from children or adults who have had measles years before is of value. H. G. Morley and O. C. Mardry of Porto Rico show that adult serum is extremely effective in protecting children from the infection of measles, in an epidemic of measles they tested the effect of the two forms of serum, out of 120 children exposed to measles by familial contact and given convalescent serum 102 or 85 per cent were completely protected and 14 out of 18 not completely protected. In the same epidemic 102 of 132 children who were exposed to measles and given adult serum were completely protected, 20 or 15 per cent were not completely protected. The results of the two forms of serum are compared in the following table.

Form of Serum	Total Children	Completely Protected	Not Completely Protected	Percentage Protected
Convalescent Serum	120	102	18	85%
Adult Serum	132	102	30	77%

obtain adult serum, the authors recommend its more extended use—(*American Journal of Diseases of Children*, Chicago, 1930, xxxix, 1,214)

Pleural and Pulmonary Lesions in Acute Rheumatic Fever

W U McClellan and J R Paul analyse 28 fatal cases of rheumatic fever, in which active pericarditis was present in 75 per cent and active pleurisy in 64 per cent. The two processes have much in common, but the pleurisy is not necessarily due to extension from the pericardium, for in 4 cases active fibrinous pleurisy was present in the absence of pericarditis. The pleurisy, which is usually not so widespread or followed by such serious consequences as is pericarditis, is regarded as a specific manifestation of the rheumatic infection. It may take several forms, but is generally accompanied by an effusion, which may be hæmorrhagic, especially in children, and is nearly always rich in fibrin. It closely resembles tuberculous pleurisy. Stress is laid on a panarteritis of the pulmonary arterioles, described as specific by von Glahn and Pappenheimer in 1926, the most striking changes are in the intima, the lining endothelium becoming swollen and vacuolated. In the media vacuoles were sometimes seen, as was also evidence of inflammation in the adventitia and surrounding tissues. Thrombosis of the affected arterioles was common. Focal hæmorrhages within the lungs and hæmorrhagic bronchopneumonia invariably accompanied the panarteritis. These appearances are admirably shown in accompanying figures [*Bulletin of the Ayer Laboratory, Pennsylvania Hospital*, Philadelphia, 1930, No 12, 17-48]. Although no reference is made to the work of Dr A E Naish, of Sheffield, on the "rheumatic lung" [*Lancet*, 1928, ii, 10], it is interesting to compare the two accounts. Naish described endothelial proliferation in the lung, like that in Aschoff's bodies, and leading to areas of consolidation which may be extensive. The endothelial proliferation was thought to spread from the walls of the alveolar capillaries, and blood was described as being extravasated. Naish quotes Pichon and Lardé-Arthés' account in 1926 of "multiple pulmonary infarcts" in association with rheumatic carditis, and it seems not improbable that the pulmonary lesions described in these three papers are identical.

Exophthalmic Goitre and its Treatment

J Donath publishes a review of the pathogenesis of exophthalmic goitre and discusses the treatment. He is of opinion that every possible form of conservative treatment should be tried before operative treatment is suggested, as the immediate operative mortality is 5 per cent. In the early stages of the disease, especially in young people, cautious treatment with iodine often results in complete cure. Iodine may be given as the tincture, one to two drops daily in a little water or milk, or as sodium iodide, three times a day in the strength of 1 gram sodium iodide

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to 20 grains distilled water, starting with 2 drops of this solution and cautiously increasing the dose up to 20 drops daily. The diet should contain large quantities of fats and carbohydrates on account of the rapid metabolism. Dr. Donath has found quinine hydrochloride, 0.5 gram twice daily for three days, repeated at three day intervals, very useful for relieving the cardiac symptoms of palpitation and pain of which these patients complain. X-ray therapy, by direct application to the thyroid, may be tried in advanced cases, and in a certain number produces very good results.—(*Medizinische Welt*, 1930, May 17, 696)

The Prognosis and Treatment of Tetanus

J. K. Calver and A. H. Goldberg state that in their experience the mortality from tetanus at the Cook County Hospital has not decreased in the past fifteen years in spite of the fact that in the last five years larger amounts of antitoxin were used and it was given intraspinally to more patients. A larger number of cases occurred between the 10 and 15 year period than between any other five year age period, and the smallest number between 1 and 5 years. The mortality was lowest between the 5 and 10 year period (34 per cent) and highest between 1 and 5 years (84 per cent). Tetanus was five times as common in males as in females; this proportion applied also to the cases in children. Tetanus following gunshot and powder wounds had a high mortality (95 per cent), following lacerations a relatively low mortality (14 per cent), and following puncture wounds a mortality about midway between the two. Cases of tetanus following wounds about the face and head were no more fatal than cases following wounds of the extremities. The incubation period in 56 per cent of the cases was under ten days, the maximum number occurring on the fifth to the seventh day. The mortality in cases having an incubation period under ten days was 84 per cent, whereas in those having an incubation period of from fourteen to twenty one days it was 25 per cent. The deaths were greatest on the second and third days of the disease and decreased rapidly thereafter. Consequently if the patient survived the first three days, the chances of his ultimate recovery were much greater. The available evidence as to the effect of the therapeutic use of antitoxin, antitoxin de-

PRACTICAL NOTES

of the pigmented skin in one case showed crystals of arsenic. The other patient was operated upon and found to have a granular liver and a large spleen—subsequently she had ascites. According to Alice Hamilton, chronic arsenical poisoning is much commoner than is generally appreciated, and the source of the poisoning may be obscure, thus a new insecticide, used for spraying fruits and vegetables, contains arseniate of lead, and is distributed as a powder, which may be inhaled or ingested —(*Proceedings of Staff Meetings of Mayo Clinic, Rochester, 1930, v, 172*)

The Zondek-Aschheim Reaction of Pregnancy

B Zondek describes the latest improvements in the test which he and Aschheim discovered for the recognition of early pregnancy by a laboratory method. The chief objection to the test raised by other workers on the method was that the urine of pregnant women contained, in addition to the hormone, a toxic substance, which in a high percentage of cases killed the mice before the result of the reaction could be ascertained. Zondek has found that this toxic substance is soluble in ether, whilst the hormone giving the characteristic reaction is not. This observation is now utilized in carrying out the test, with the result that failure due to death of the animals from toxæmia does not occur. The method is briefly as follows —30-40 c cm of the urine to be tested are acidified, if alkaline, with acetic acid, filtered, and the filtrate shaken for five minutes with 90-120 c cm of pure ether. The ether is allowed to evaporate and the urine is then ready for injection. As the urine is no longer toxic, it is possible to inject larger doses into the animals, but Dr Zondek does not recommend that they should be killed in less than 100 hours, the shortest time in which a definite positive result can be expected —(*Klinische Wochenschrift, 1930, May 24, 964*)

Arachno-dactyly.

Arachno dactyly, or spider fingers, is one of the curious defects which have recently received due attention and a long, if graphic, name. A W Ormond, who has previously written on the subject, now collects more than thirty cases in an article that must be regarded as a standard source of reference. The characteristic features are elongation of the long bones, especially of the hands and feet, undeveloped musculature of the whole body, elongation of the tendons, absence of all subcutaneous fat, congenital heart disease, spinal curvatures, and infantilism. He points out that it is an inherited mesoblastic defect, the antithesis of achondroplasia, and, in addition to the general manifestations, is characterized by three ocular signs—congenital dislocation of the lens, tremulous irides, and small miotic pupils which do not react to atropine. It is essentially a condition in which growth and evolution are profoundly altered at a very early stage in development. Like cretinism, achondroplasia, mongolism, gigantism, and dwarfism, it is tempting to ascribe arachno-dactyly to disordered function of the endocrine glands concerned with growth —(*Guy's Hospital Reports, 1930, lxxx, 68-81*)

THE PRACTITIONER

A series of illustrative cases makes interesting reading, but is of little practical value, as many of the cases were complicated in nature, insomnia not always the predominant symptom. The practitioner, for whom the book is primarily intended, will certainly find the chapters on general treatment and medicinal treatment of considerable value in dealing with difficult cases of insomnia.

Visceroptosis and Allied Abdominal Conditions associated with Invalidism. By H. BIRNBEGER, D.S.O., M.D., M.R.C.P.
Oxford Medical Publications. 1930. Humphrey Milford,
Oxford University Press. Demy 8vo. Pp. 176. Price 10s. 6d.

THE text of this store house of information appeared in the *Quarterly Journal of Medicine* and was accepted for the degree of M.D. Edinburgh. Dr. Robert Hutchison writes a brief appreciative foreword, and is rewarded later on by the addition of an "n" to his name. The literature of the subject is fully gone into, as is shown by the 611 items in the bibliography. The historical summary is divided into sections dealing with the period before Glénard began to publish his views, the interval before radiological assistance became available, and the subsequent years in this century, when the main lines of advance have been provided by radiologists, anthropologists and surgeons. The numerous hypotheses in connection with visceroptosis are fully set out with a summary of the criticism they have evoked. The chapter on auto-intoxication and constipation bears a good example of the method of presentation. The influence of the bodily constitution is discussed in an interesting chapter, and then diagnosis and treatment are described. In the latter the psychological measures are admirably put forward. The work as a whole is full of information and inspires confidence by its common sense.

Modern Infant Feeding. By BRYAN MARSH, C.M.G., M.D., M.R.C.P. Modern Treatment Series. London: J. & A. Churchill Co., 1930. Pp. 160. Price 5s.

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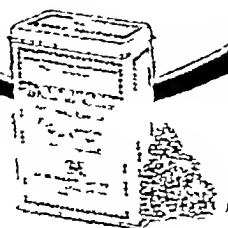
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